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Project Title: Sulphur HMA Wild Horse Gather

Location: Iron, Beaver, and Millard Counties, Utah

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CHAPTER 1. PURPOSE AND NEED

Background

With passage of the Wild and Free Roaming Horse and Burro Act of 1971 (WFRHBA), Congress stated that, "Wild horses are living symbols of the pioneer spirit of the West." In addition, the Secretary was ordered to, "…manage wild free-roaming horses and burros in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands." From the passage of the Act, through present day, the Bureau of Land Management (BLM) Cedar City Field Office (CCFO) has endeavored to meet the requirements of this portion of the Act. The procedures and policies implemented to accomplish this mandate have been constantly evolving over the years. Since the passage of the WFRHBA, management knowledge regarding horse population levels has increased. For example, wild horses are capable of increasing numbers 15-20% annually (NAS 2013), resulting in the doubling of wild horse populations about every 3 years. This Environmental Assessment (EA) analyzes the gather and removal of wild horses from the Sulphur Herd Management Area (HMA) located in southwest Utah (see map, Appendix 1).

Purpose and Need for the Proposed Action

The proposed action is needed to be in compliance with Section 3(b)(2) of the WFRHBA (PL 92-195) as amended, which states that "Where the Secretary determines…that an overpopulation exists on a given area of the public lands and that action is necessary to remove excess animals, he shall immediately remove excess animals from the range so as to achieve appropriate management levels." The requirement for the authorized officer to remove excess animals immediately is also included in 43 CFR (Code of Federal Regulations) 4720.1. The need for specific actions includes:

- Achieve a thriving natural ecological balance between wild horse populations, livestock, wildlife (elk), rangeland vegetation and riparian resources, and protect the range from further degradation by wild horses.
- Achieve and maintain wild horse populations at appropriate management levels (AML).
- Collect information on herd characteristics to better understanding the habitat use and movement of wild horses within the Sulphur HMA; understand their interactions with other resources and use of public lands; and improve population inventories.
- Determine herd health.

Conformance with BLM Land Use Plans

The Proposed Action and alternatives are subject to two land use plans: the Pinyon Management Framework Plan (MFP) approved in 1983 and the Warm Springs Resource Area

Resource Management Plan (RMP) approved in 1987. The Proposed Action is in conformance with MFP Decision RM 1.8 and WH1.1 which states, "…remove horses as required to maintain horse numbers at or below 1982 inventory levels…consolidate and stabilize the Mountain Home-Sulphur herd unit and establish these numbers between 135 and 180 horses." The MFP also states that the number of herd units and the population of each herd would depend on the results of monitoring studies, range condition, viewing opportunities, movement of wild horses, cooperative management, and range developments.

The Warm Springs RMP identifies the Sulphur HMA as being suitable for wild horses and will maintain horse numbers in the HMA through "periodic removals." The Sulphur HMA Plan identifies the HMA boundaries in both land use plans as suitable for wild horses and states the removal objective for both land use plans as "remove excess wild horses from the Sulphur HMA when the population of adult horse, those two and older, reaches the upper level of 180 horses." If wild horses of all ages are included in the AML number, the AML is 165 head to 250 head.

The Sulphur HMA overlaps with the Hamlin Valley greater sage-grouse Priority Habitat Management Area (PHMA) and, as such, is subject to the Greater Sage Grouse Environmental Impact Statement Record of Decision (ROD) and Approved Resource Management Plan Amendments (ARMPA) for Utah, approved in September 2015. The action alternatives are supported by MA-WHB-1, which states, "Manage HMAs in GRSG habitat within established appropriate management level ranges to achieve and maintain GRSG habitat objectives" and MA-WHB-3, which states, "Prioritize gathers and population growth suppression techniques in HMAs in GRSG habitat, unless removals are necessary in other areas to address higher priority environmental issues, including herd health impacts."

Relationship to Statutes, Regulations or other Plans

The action alternatives would comply with the following laws and/or agency regulations and are consistent with federal, state and local laws, regulations, and plans to the maximum extent possible.

- Public Law 92-195 (Wild Free-Roaming Horse and Burro Act of 1971) as amended by Public Law 94-579 (Federal Land Policy and Management Act of 1976)
- Public Law 95-514 (Public Rangelands Improvement Act of 1978)
- Section 106 of the Historic Preservation Act
- Taylor Grazing Act (TGA) of 1934
- Federal Land Policy and Management Act (FLPMA) of 1976 (43 U.S.C. 1701 et seq.)
- Title 43 CFR 4700 Protection, Management, and Control of Wild Free-Roaming Horses and Burros
- Standards and Guidelines for Healthy Rangelands, 1997 (BLM-UT-GI-98-007-1020)

- Greater Sage Grouse Environmental Impact Statement Record of Decision (ROD) and Approved Resource Management Plan Amendments (ARMPA) for Utah, approved in September 2015
- Beaver County RMP (2017) states in Objective 2, “keep wild free-roaming horses at or below established AMLs in all HMAs in Beaver County.”
- Iron County RMP (2017) states, “excess wild horses that exceed appropriate management levels must be removed to keep the fragile balance with other uses.”

Public Involvement

Public involvement was initiated by posting the proposal on the BLM’s ePlanning website on May 6, 2020. Iron, Beaver and Millard county commissioners have been in contact with the BLM requesting the removal of excess wild horses from private and public lands to within AML. The counties have requested that population growth suppression treatments be used on wild horses to reduce future population growth of wild horses.

As required by regulation [43 CFR 4740.1(b)], a public hearing was held November 14, 2019 and will be held in subsequent years to discuss the use of helicopters and motorized vehicles in the management of Utah BLM’s wild horses and burros. This meeting will be advertised in papers and radio stations statewide. Similar meetings have been held each year a gather has been implemented in Utah since the passage of Federal Land Policy and Management Act of 1976. Comments received during the public comment period and the public meetings will be considered and, if applicable, will be addressed in management actions, NEPA documents, and decision documents using the most current direction from the National Wild Horse and Burro Program.

Identification of Issues

Identification of issues for this assessment was accomplished by considering the resources that could be affected by implementation of at least one of the alternatives, through involvement with the public and input from the BLM interdisciplinary team. Resources which are not present or are not affected by the proposed action or alternatives are included as part of the Interdisciplinary Team Checklist (Appendix 2). Issues which are necessary to make a reasoned choice between alternatives or determine levels of significance include the following and are analyzed in Chapter 3.

- How will the removal of wild horses affect rangeland health (soil and vegetation)?
- How will removal of wild horses affect livestock grazing?
- How will removal of wild horses affect wild horse health?

CHAPTER 2. DESCRIPTION OF ALTERNATIVES

Based on identified issues, four alternatives are considered in detail:

- Alternative 1: Proposed Action – Gather and remove excess wild horses to within AML and implement population growth suppression using PZP-22 or most current formulation
- Alternative 2: Gather and remove excess wild horses to within AML range, and implement population growth suppression using GonaCon
- Alternative 3: Gather and remove excess wild horses without population growth suppression
- Alternative 4: No Action –No gather, removal or use of population growth suppression

Alternatives considered but not analyzed in detail include:

- Wild horse management implementing population growth suppression without removals to Achieve AML
- Remove or reduce livestock within the HMA
- Gather wild horses to the AML upper limit
- Population growth suppression treatment only including using bait/water trapping to dart mares with PZP remotely (no removal)
- Bait or water trap only
- Control wild horse numbers by natural means
- Allow public to capture and remove wild horses
- Gather and release excess wild horses every two years and apply two-year PZP to horses for release
- Use alternative capture techniques instead of helicopters to capture excess wild horses

Description of Alternatives Considered in Detail

Alternative 1 – Proposed Action – Gather, Removal and Use of PZP-22

Wild horses would be gathered from the Sulphur HMA to achieve and/or maintain the estimated wild horse AML, collect information on herd characteristics, conduct research, collect genetic samples, determine herd health, provide for public safety, and establish a thriving ecological balance with the other resources within the HMA. The information gained from these actions would then be used in future management of wild horses within the CCFO. The gather area would include the Sulphur HMA and lands where wild horses have strayed outside the HMA (up to 10 miles). In addition, the capture and removal operations of wild horses that stray to areas along Highway 21 and become a public health and safety issue would be gathered and removed. The BLM would conduct gathers over a 10-year period to remove excess wild horses until the Sulphur HMA wild horse population is at the lower AML (see Table 1.1). Based on past gather success in the Sulphur HMA area, only 60-70% of the population can be gathered in a single

gather operation, thus requiring multiple gathers over more than a one-year period to achieve AML. The gather, removal and fertility treatment numbers would vary each year over the 10-year period to accomplish the objective of achieving and maintaining the wild horse population to within AML. Other administrative factors (budget, adoptions, holding space, etc.) and gather success could also impact the numbers gathered, removed, or treated during each operation over the 10-year period.

If the lower AML were reached before the end of the 10-year period, additional gathers would be conducted to maintain the wild horse population in the Sulphur HMA to within the AML. Population growth suppression vaccine PZP-22, or the current formula) would be used reduce the annual population growth. The primary use of population growth suppression would be to maintain the population within AML once achieved. It could be used prior to achieving AML if gather success, holding capacity limitations, population growth rates, other national gather priorities or other circumstances prevent achieving AML during a gather. Other administrative actions (such as temporary livestock reductions, changes in grazing rotation, range improvements, fuels management, etc.) would be ongoing and addressed in other NEPA documents.

Table 1.1 Estimated 2020 Population, Capture and Removal Numbers

HMA	AML	2021 Estimated Population 3/1/2021*	2021 Gather Numbers to Lower AML**	2022 Removal Number to Lower AML**	2021 Gather Numbers to Upper AML**	2022 Removal Numbers to Upper AML**
Sulphur	**165-250**	414	249	299	164	214

**The estimated population is based on an aerial population inventory completed in March 2020 minus horses gathered in September 2020. A Simultaneous Double Count Method was used. A total direct count of 901 horses were recorded. Photos of each band of horses was taken during each transect along with additional data. Horses were identified as individuals or as a band by their color, leg markings, face markings, and finally area/time recorded. The photos were used to eliminate any horses that were observed more than once. The planned flight paths were loaded into a GPS and followed. The actual fight paths were recorded by GPS. Based on the National Academy of Science (NAS) report released in 2013 the estimated population could be 20%-30% lower than the actual population.*

***Removal numbers were based on the estimated population as of March 1, 2021. An additional population increase of the foal crop in the spring of 2021 (estimated at 20% increase) will need to be added to removal numbers.*

Authorized wild horse capture techniques would be used to capture excess wild horses from the Sulphur HMA. These techniques include helicopter drive trapping, water, and bait trapping, and roping. One or a combination of capture techniques may be utilized. The selected technique(s) would depend on herd health and the season (fall, winter, or summer) in which the gather is scheduled to maximize gather success and minimize impacts to wild horses.

Each released mare would receive a single dose of the two-year PZP contraceptive vaccine or similar vaccine/population growth suppression treatment. When injected, PZP (antigen) causes the mare's immune system to produce antibodies; these antibodies bind to the mare's eggs and effectively block sperm binding and fertilization (Zoo Montana, 2000). PZP is relatively inexpensive, meets BLM requirements for safety to mares and the environment, and can easily be administered in the field. In addition, among mares, PZP contraception appears to be completely reversible.

Global positioning system (GPS) and very high frequency (VHF) radio collars and tags can be used to provide high spatial and temporal resolution information for detecting free-roaming horse movement, locations and for other monitoring purposes including but not limited to effectiveness of population inventories, demographics, habitat use, interactions with other resources and movements of wild horses.

Only female horses would be fitted with GPS collars, while males or females would have a GPS radio transmitter tag braided into their tails and manes. Once tags are braided into the tails or manes they would be held in place with a non-toxic, low temperature curing epoxy resin. Collar would only be placed on horses that are 3 years old or older and in Henneke body condition score 4 or greater. Animals that are "thin" (Henneke score of $\leq$3), deformed, or who have any apparent neck problems would not be fitted with a collar. As tags are small (<200g) and are not worn around the neck they are considered of low burden to the animal, and therefore could potentially be worn by animals in lower body condition. All radio collars would have a remote manual release mechanism in case of emergency and a timed-release mechanism which would be programmed to release at the end of the monitoring period. No collars would remain on wild horses indefinitely. If the collar drop-off mechanism fails at the end of the monitoring period those individual horses would be captured and the collars manually removed. Each collared horse would be observed once a month while collared. Radio tagged horses would not need to be observed as often but would be observed regularly (6-10 times a year).

Regular population inventories would be conducted at a minimum of every 3 to 4 years to calculate the estimated population that would be used to determine the number of horses captured, removed, and treated with population growth suppression each gather. A population inventory was conducted on the Sulphur HMA in June 2020 and was used to estimate the population, capture, removal, and treated numbers for the 2021 gather. This process would be followed over the 10-year period to achieve and maintain the wild horse population within AML.

Data including sex and age distribution, reproduction, survival, condition class information (using the Henneke rating system), color, size and other information may also be recorded, along with the disposition of that animal (removed or released). Hair and/or blood samples will be acquired every gather in accordance with current guidance (IM # 2009-062), to determine whether BLMs management is maintaining acceptable genetic diversity (avoiding inbreeding depression).

The capture and removal operations would be accomplished using design features listed below. Additional design features are contained in Appendix 3. The procedures to be followed for implementing fertility control and affixing radio collars may be found on the ePlanning website (https://eplanning.blm.gov/eplanning-ui/project/1505407/510). Public Safety and Nuisance horses that stray along Highway 21 will be the first priority for removal. Removal of animals from outside the HMA and on lands not managed by the BLM would be given priority where possible.

Design Features to Minimize Impacts

- Multiple capture sites (traps) may be used to capture wild horses.
- When actively trapping wild horses, the trap will be checked daily. Horses would be either removed immediately or fed and watered for up to several days prior to transport to a holding facility.
- Whenever possible, capture sites will be located in previously disturbed areas. Generally, these activity sites will be small (less than one half acre) in size.
- No new roads will be constructed.
- No trap sites will be located on areas where threatened, endangered, and special status species occur without clearance.
- All capture and handling activities will be conducted in accordance with the most current policies and procedures of the BLM.
- Helicopter gathers and water/bait trap gathers of a large size (more than 30 horses) will not be conducted between March 1 and June 30.
- During capture operations, safety precautions will be taken to protect all personnel, animals and property involved in the process from injury or damage.
- Only authorized personnel will be allowed on site during the removal operation.
- Private landowners or the proper administering agency(s) will be contacted, and authorization obtained prior to setting up traps on any lands which are not administered by BLM.
- Wherever possible, traps will be constructed in such a manner as to not block vehicular access on existing roads.
- If possible, traps will be constructed so that no riparian vegetation is contained within them. Impacts to riparian vegetation and/or running water located within a trap (and available to horses) will be mitigated by removing horses from the trap immediately upon capture. No vehicles will be operated on riparian vegetation or on saturated soils associated with riparian/wetland areas.
- Scheduling of gathers will minimize impacts with big game hunting seasons whenever possible.
- The helicopter will avoid eagles and other raptors and will not be flown repeatedly over any identified active raptor nests.
- No unnecessary flying will occur over big game on their winter ranges or active fawning/calving grounds during the period of use.

- Small amounts of carefully managed chemicals may be used to treat sick or injured animals at the capture sites.
- Weed free hay will be used in trap sites and temporary holding facilities located on BLM-administered lands.
- Females 3 years and old being returned to the HMA may be collared. No males will be collared. If collars are too tight, the release function will be deployed remotely. or collar will be removed after capture. If neck abrasions or sores caused by a collar are observed and have not healed within 4 weeks of when it is sighted the collars remote-release will be deployed or the horse will be capture as soon as possible to remove the collar.
- Male and Female horses being release after gather operations may have Global Positioning System/VHF radio transmitter tags braided into their tails or mane.

Alternative 2 – Gather, Removal and Use of GonaCon

Under Alternative 2 management actions would be similar to the proposed action with the exception that all the released mares would be treated with the population growth suppression vaccine GonaCon™ instead of PZP-22 (or latest formula). Treated animals would need to be held for a minimum of thirty days after first treatment to administer a booster shot to increase efficacy and treatment longevity. As with PZP, the long-term goal of GonaCon-Equine use is to reduce or eliminate the need for gathers and removals (NRC 2013). GonaCon-Equine vaccine is an EPA-approved pesticide (EPA, 2009a) that is relatively inexpensive, meets BLM requirements for safety to mares and the environment, and is produced in a USDA-APHIS laboratory. Its categorization as a pesticide is consistent with regulatory framework for controlling overpopulated vertebrate animals, and in no way is meant to convey that the vaccine is lethal; the intended effect of the vaccine is as a contraceptive.

The BLM would return to the HMA as needed over the ten-year period to remove excess horses and to re-apply GonaCon-Equine and initiate new treatments to maintain contraceptive effectiveness in controlling population growth rates. GonaCon-Equine can safely be reapplied as necessary to control the population growth rate. Even with one booster treatment of GonaCon-Equine, it is expected that most, if not all, mares would return to fertility at some point, although the average duration of effect after booster doses has not yet been quantified. It is unknown what would be the expected rate for the return to fertility in mares boosted more than once with GonaCon-Equine. Once the herd size in the project area is at AML and population growth seems to be stabilized, BLM will determine the required frequency of new mare treatments and mare re-treatments with GonaCon, to maintain the number of horses within AML. Reference in this text to any specific commercial product, process, or service, or the use of any trade, firm or corporation name is for the information and convenience of the public, and does not constitute endorsement, recommendation, or favoring by the Department of the Interior.

Alternative 3 - Gather and Removal

This alternative would be the same as the proposed action; however, no population growth suppression treatments would be applied. If gather objectives are not met, additional gathers in

following years would occur until the population reached the lower AML of 165 head within the Sulphur HMA. The population would then be controlled within AML (165-250 head) through gathers and removals.

Alternative 4 - No Action Alternative

No wild horse gathers, removals, or use of population growth suppression would be undertaken to control the size of the wild horse population at this time. Wild horse populations of the Sulphur HMA would not be actively managed at this time.

Alternatives Considered but Eliminated from Further Analysis

Several alternatives were considered but eliminated from further analysis. These alternatives are described in Appendix 4.

Monitoring

Under all alternatives, the following monitoring would be required to determine if the program goals are being met. CCFO personnel would collect and maintain the data. Population inventory would be conducted every three years on the HMA as required by the WFRHBA and BLM policy. Vegetation monitoring studies (rangeland health, trend, and utilization) would continue to be conducted in conjunction with livestock, wildlife, and wild horse use.

For alternatives 1-3, monitoring would take place utilizing radio collars or radio tags to locate individuals and to record population dynamics, responses to change in animal density, management interventions, seasonal weather, and climate. Birth rates and population increase would be monitored after Population growth suppression (as funding and priorities allow).

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

The affected environment was considered and analyzed by an interdisciplinary team as documented in the Interdisciplinary Team NEPA Checklist (Appendix 2). The checklist indicates which resources of concern are either not present in the project area or would not be impacted to a degree that requires detailed analysis. Issues which are necessary to make a reasoned choice between alternatives or determine levels of significance are described below.

ISSUES

Issue 1. How will removal of wild horses affect rangeland health (soil and vegetation)?

Affected Environment

Rangeland Health Assessments were completed on 5 grazing allotments within the gather area since 2007 as indicated by the Monitoring Report for the Sulphur HMA. All the allotments or portions of allotments within the HMA failed to meet at least one of the standards. Causal factors for not meeting standards included, but were not limited to, Pinyon Pine/Juniper (PJ) encroachment, drought, and grazing by livestock, wildlife, and wild horses.

Standard 1 for Upland Soils was being met on the Bennion Spring, Indian Peak, and South Pine Valley allotments. Two of the allotments (Atchison Creek and Stateline) did not meet Standard 1. Indicators used to reach the "not meeting" conclusion were excessive plant pedestals, percent bare ground, litter movement and soil loss. Many of the sites lacked resistance to soil erosion and lacked residual vegetation (and litter). Flow patterns were identified both in and outside of animal trails and hoof action from livestock, wild horses and wildlife was found to be contributing to the compaction and loss of soil in areas within one half mile of water sources, including riparian areas.

Within portions of the HMA, chaining and/or burning PJ woodlands, followed by aerial seeding, changed much of the PJ woodlands to a grassland and shrub community. Many of these treated areas are now 20-30 years old, and pinyon/juniper or sagebrush have re-populated these areas, reducing vegetation diversity. This reduction in plant species diversity has placed the HMA in the 'functioning at risk' category (4700, Standards and Guidelines Study files 2004-2008).

The current drought cycle has had a tremendous influence on rangeland vegetation. During the period from 1999-2004, 2012-2014 and 2019-2021 average annual precipitation never exceeded 12 inches within the Sulphur HMA except at the high elevations of Mountain Home and Indian Peak. The average for the rest of the HMA was 75% or below of the normal precipitation for that area.

Year-long grazing by wild horses has put additional stress on key forage species already affected by drought. Some key forage species have been lost. Recovery could take 5 to 15 years, depending on how severely the drought affected a particular area. Two or more years of drought have far greater impact on vegetation than one year of drought followed by normal or above-normal precipitation. Utilization studies that have been completed during the past 20 years, along with Cedar City qualified staff observations, suggest that as wild horse populations increase, they contribute to the decrease of forage species. This is especially true in grassland, sagebrush/grassland, and seeded areas.

Impacts from All Alternatives

This analysis assumes that livestock use would continue at levels as established by grazing permit renewal decisions, big game numbers would continue as established by herd management plans and state law and removal of wild horses would be as proposed to within the AML levels specified for HMA.

Impacts Comparison

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4
Rangeland Health	Aide grazing allotments	Similar	Eventually rangeland health would be reduced below a threshold that

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4
	currently not meeting Rangeland Health Standard 1 to move towards attainment of that Standard		would be difficult to recover from. Considerable progress towards the Standards and Guidelines for Healthy Rangelands would not occur.
Vegetation Use Levels	Use levels would be within management plan objectives	Use levels would be higher but stay within management plan objectives	Heavy and severe use of vegetation resources by wild horses would increase
Vegetative Vigor	A reduced demand for forage would help improve the vigor of vegetation, allow for seedling establishment and increased ground cover	Less improved vigor	Degradation of plant communities
Vegetative Trend	Upward trend in key forage species	Less upward trend	Downward trends in key perennial species. The vegetative functional/ structural groups (i.e. grass, shrubs, trees etc.) would be changed as grasses are over utilized during critical growing seasons.
Drought Recovery	Improved recovery if precipitation remains near or above long-term average levels.	Less improved recovery	
Susceptibility to invasive species	Improved vegetative vigor will decrease susceptibility to invasive species	Similar	Increased susceptibility
Soil Stability	Increased litter would provide additional	Similar	Current indicators of poor soil conditions would remain on the allotments currently not meeting

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4
	protection from wind and water erosion, promote infiltration, detain surface flows and retard soil moisture loss by evaporation, allowing for better vegetative productivity. Indicators, such as pedestals, bare ground, litter movement, flow patterns, etc. should lessen with implementation of the proposed action. Further, reduced numbers of horses should result in less compaction of wet sites, such as riparian areas and enhance soil and vegetation production there.		Rangeland Health Standards. Additional indicators, such as increased overland flows, rills and gullies could occur as additional soil was lost from the allotments. Wind erosion could become a factor, where it is not currently.
Capacity of habitat to provide water and forage for all species	Improved	Similar	Reduced production resulting in reduced forage availability to wildlife, livestock, and wild horses.
Disturbance of vegetation and soils	Past trap site locations have recovered within a year with vegetation to stabilize the soils.	Same	None

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4
	No substantial compaction of soils has occurred from past gathers.		

Issue 2. How will removal of wild horses affect livestock grazing?

Affected Environment

Approximately 8,355 sheep Animal Unit Months (AUMs) and 17,076 cattle AUMs are permitted on 9 allotments that have some portion of the allotment within the HMA. In general, actual livestock use within the HMA or in the allotments has been substantially reduced during the years of drought over the past fifteen years. As livestock grazing permits are evaluated, additional adjustments to the total livestock grazing may be made through the permit renewal process based on current vegetative and climatic monitoring information. Table 3.2 identifies the current season of use and permitted use within each of the allotments associated with the Sulphur HMA.

Table 3.2 Allotments in or near the Sulphur HMA

FILLMORE ALLOTMENTS	CLASS OF LIVESTOCK	SEASON OF USE	ACTIVE AUMS	PERCENT OF ALLOTMENT WITHIN HMA
Fairview (I)	Sheep	10/16-2/28	4254	73%
Hamblin (I)	Cattle	10/16-6/5	2225	100%
Stateline (M)	Sheep	11/1-4/30	4753	51%
CEDAR CITY ALLOTMENTS	**CLASS OF LIVESTOCK**	**SEASON OF USE**	**ACTIVE AUMS**	**PERCENT OF ALLOTMENT WITHIN HMA**
Atchison Creek (M)	Cattle	7/1-8/15	267	93%
Bennion Spring (I)	Cattle	4/1-11/30	2130	5%
Indian Peak (I)	Cattle Sheep	3/1-2/28 6/15-2/28	1476 282	92%
Mountain Home (M)	None			100%
North Pine Valley (I)	Cattle	3/1-2/28	5172	8%
South Pine Valley (M)	Cattle	3/1-2/28	5806	2%

*Management Category (I-Improve, M-Maintain)

Impacts from all Alternatives

Annual authorized livestock use may be adjusted due to several factors, including rangeland health or drought. Adjustments to livestock permits (if any) would be made during the livestock allotment permit renewal process. This action would have no direct impact on current livestock permits in terms of active AUMs, season of use and/or terms and conditions.

Impacts Comparison

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4
Rangeland Health	Aide grazing allotments currently not meeting Rangeland Health Standard 1 to move towards attainment of that Standard	Similar	Eventually rangeland health would be reduced below a threshold that would be difficult to recover from. Considerable progress towards the Standards and Guidelines for Healthy Rangelands would not occur.
Forage availability for livestock use	Increased quality and quantity of forage	Similar	Because horses compete directly with cattle for resources, there is the potential for authorized livestock to be reduced in line with forage availability, which could impact permittees and result in long-term changes in grazing management.
Competition for Forage	Competition between livestock, wildlife and wild horse would be reduced	Similar	
Livestock Permit Adjustments	Reduce the likelihood of adjustments to current active livestock permits attributable to overuse of resources by wild horses.	Similar	
Long-term Sustainability of Livestock Use	Increased long-term sustainability of authorized livestock use within the HMAs at the permitted levels	Similar	

Issue 3. How will gathering wild horses affect wild horses?

Affected Environment

Drought conditions and overpopulation of wild horses between 1999 and 2005 have reduced forage production in some of the key wild horse habitat areas. In 2007, 2008, 2013, 2014, 2015 2019 and continuing in 2020, similar drought conditions and high populations of wild horses have occurred. Although a portion of the HMA does not have any livestock grazing and livestock numbers were reduced and/or completely removed from the allotments in the HMA during these years, excess wild horses have overgrazed many areas during critical growth periods. As of March 16, 2021, precipitation data indicate that the HMA has received only 30-50% of normal moisture. This places the HMA in extreme drought going into the 2020 summer. Wild horse and elk utilization within key areas on the Mountain Home Allotment for 2020 was heavy. This, along with the reduced vigor of the plants because of the drought, is causing mortality of key forage species within in that allotment and has been observed in other areas within the HMA with high concentrations of wild horses.

Because horses have a cecal digestive system and can cover longer distances than can domestic ruminants, wild horses can remain in good health under forage conditions fatal to domestic ruminants (Holechek, 1989). In 1999 and 2000, range conditions within the HMA became so bad that even with almost no livestock use and several hundred head of wild horses removed, health of some horses declined to critical conditions. Some horses were lost to starvation and dehydration during those years. In 2015, eight wild horses are known to have died due to lack of forage and/or water. In the summer of 2020, three wild horses are known to have died due to lack of forage and/or water, with it anticipated that more will die over the winter.

The overriding limiting factor for the carrying capacity of the horses in the HMA is not the available forage, although this is a concern, but is the supply of reliable water during the summer months. In 2015, 160,000 gallons of water was hauled to three different sites on the northern part of the HMA to sustain wild horse health. In 2020, all the reliable water sources had to be worked on to maintain water at those locations. Upland vegetation in proximity to reliable water sources and these water haul sites is used heavily by wild horses, wildlife, and livestock, while vegetation in areas farther from water is used slightly. There are areas in the south part of the HMA that have adequate forage but are not usable for most of the year due to lack of water and/or seasonal condition (i.e. snow depth). During drought conditions, as has occurred during 1999-2004, 2013-2015 and the last few years, several water sources dry up, concentrating wild horses on the remaining water sources and limiting the number of horses that the HMA can support without hauling water. The increased concentration of wild horses at these sites reduces vegetation and causes soil compaction. The water hauling is not sustainable for long periods of time.

AML and Population Estimates

AML	Population 2010	Population 2016	Population 2020 3/1/2020	Wild Horse AUMS at High AML	Estimated Wild Horse AUMS being Utilized in 2020
165-250	500	957	1,193	3,000	14,316

Based on observable data, wild horse numbers are expected to increase at a rate of 15-20% annually. The current estimated population of the Sulphur HMA was developed after completion of an aerial population inventory flight in June 2020 using the Simultaneous Double Count Method (Appendix 5 and 6). An estimated population of 938 horses was identified during the inventory. That is 373% of AML. Photos of each band of horses was taken during each transect along with additional data. Horses were identified as individuals or as a band by their color, leg markings, face markings, and finally area/time recorded. This information was used to eliminate any horses that were observed more than once. The planned flight paths were loaded into a GPS and followed. The actual flight paths were recorded by GPS. Based on the National Academy of Science (NAS) report released in 2013 the estimated population could be 20%-30% lower than the actual population.

Due to the high population the wild horses have used what is believed to be the winter habitat during the summer. Many are traveling outside the HMA in search of water, forage, and space. More information is needed to determine the expanse of these movements. Similar conditions in 1999-2001 of high wild horse population combined with drought reduced horse health and several wild horses died on the range. In 2015, several horses were euthanized due to poor body condition and injuries that occurred from fighting at the limited water sources.

Currently there are approximately 150 head of wild horses that are within 6 miles of Highway 21. These horses are on the highway in search of space, forage, and water. They have been seen drinking out of the rumble strips in the road after rain showers. From 2014 to present several horses have been hit and killed in vehicle collisions along Highway 21. In 2018, nine miles of new fence was constructed along Hwy 21 from Mormon gap to mile marker 25. This helped reduce the number of wild horses getting on to the Highway, but several miles outside the HMA remain open to the horses. If the population remains above AML, the presence of wild horses along the highway would increase and more vehicle collisions would occur. BLM continues to look for opportunities to fence the right-of-way along highway 21 in this area.

Impacts from Alternatives 1-3

Average gather success in the HMA is between 60-70% using the helicopter drive trap method. Because it would take several successive gather operations over a period of up to ten years to get the wild horse population of the HMA to low end of AML, bands of horses would continue to leave the boundaries of the HMA into areas not designated for their use in search of space, forage, and water. Once AML was reached additional gathers would be needed to maintain the

population within AML. The stated objectives for wild horse herd management area would not be met with just the first gather operation but would be met over time.

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4 (No Action) *
Herd Health	As a result of lower density of wild horses across the HMA following the removal of excess horses, competition for resources would be reduced, allowing wild horses to utilize preferred, quality habitat. Confrontations between stallions would also become less frequent, as would fighting among wild horse bands at water sources. Achieving the AML and improving the overall health and fitness of wild horses could also increase foaling and foaling survival rates over the current conditions.		Horses will likely die of dehydration and starvation. The No Action Alternative would allow wild horse populations to increase beyond the carrying capacity of the rangeland resources within the HMA. As observed during the summer of 2015 and 2020 the general health of the wild horse population in the HMA would be reduced as horse numbers increased. Large die-offs may occur if the population increased to a point where available forage and water were depleted. This would be especially true during drought or other events such as wildfire.
Condition of Mares	The removal of excess animals coupled with anticipated reduced reproduction (population growth rate) as a result of Population growth suppression should result in improved health and condition of mares and foals as the actual population comes into line with the population level	Less improvement in mare condition due to no population growth suppression activities.	There would be a steady increase in wild horse numbers for the foreseeable future, which would continue to exceed the carrying capacity of the range. Individual horses would be at greater risk of death by starvation and lack of water. The population of wild horses would compete for the available water and forage resources, affecting mares and foals most severely. Significant loss of the wild horses in the HMA due to starvation or lack of water would have obvious consequences to the long-term viability of the herd. As a result, the No Action Alternative would not ensure healthy rangelands, would not allow for the

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4 (No Action) *
	that can be sustained with available forage and water resources.		management of a healthy, self-sustaining wild horse population, and would not promote a thriving natural ecological balance.
Herd Disturbance	Reduced population growth rates with the use of Population growth suppression would be expected to extend the time interval between gathers and reduce disturbance to individual animals as well as to the herd social structure over the foreseeable future. Once AML is achieved and fertility treatments are conducted on a regular basis, the number of gathers needed to maintain AML would be reduced. As a result, there would be fewer disturbances to individual animals and the	Similar, but without population growth suppression, gathers would need to be more frequent.	Short-term herd dynamics would not be impacted under this alternative. Horses would continue to be free-roaming and follow natural patterns. However, if populations increased beyond the carrying capacity, herd dynamics could be impacted because of declines in individual horse health. Near normal populations exhibit a 1:1 sex ratio. Population shifts favoring males could occur as males are better adapted to compete for resources during changing environmental conditions.

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4 (No Action) *
	herd, and a more stable wild horse social structure would be provided.		
Handling Stress	Impacts to individual animals may occur because of handling stress associated with the gathering, processing, and transportation of animals. The intensity of these impacts varies by individual animal and is indicated by behaviors ranging from nervous agitation to physical distress. Mortality to individual animals from these impacts is infrequent but does occur in 0.5% to 1% of wild horses gathered in a given gather. Other impacts to individual wild horses include separation of members of individual bands of wild horses and removal of animals from the population. Impacts may include spontaneous abortions in mares, and increased conflict between stallions. Traumatic injuries usually do not result from these conflicts. These injuries typically involve a bite and/or kicking with bruises which do not break the skin. Spontaneous abortion events among pregnant mares following capture is also rare, though poor body condition can increase the incidence of such spontaneous abortions. Given the timing of this gather, spontaneous abortion is not considered to be an issue for the proposed gather. The gathers would occur frequently making wild horses more difficult to trap. The horses would become very		There would be no direct impacts from handling stress.

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4 (No Action) *
	evasive and learn to evade the helicopter by taking cover in treed areas and canyons. Wild horses would also move out of the area when they hear a helicopter, thereby further reducing the overall gather efficiency. Frequent gathers would increase the stress to wild horses, as individuals and as entire herds. It would become increasingly more difficult over time to repeat gathers if the gathers are within two-year intervals to successfully treat mares with PZP.		
Heat Stress	Gathering the wild horses during the fall/winter reduces risk of heat stress, although this can occur during any gather, especially in older or weaker animals. Heat stress does not occur often, but if it does, death can result.		No impact.
Social Displacement	The wild horses that are not captured may be temporarily disturbed and move into another area during the gather operations. Except for changes to herd demographics, direct population wide impacts have proven, over the last 35 years, to be temporary in nature with most if not all impacts disappearing within hours to several days of when wild horses are released back into the HMA. No observable effects associated with these impacts would be expected within one month of the gather operations or release, except for a heightened awareness of human presence.		No impact.
Foals	A few foals may be orphaned during gathers. Occasionally, foals are gathered that were already orphans on the range (prior to the gather) because the mother rejected it or died. These foals are usually in poor, unthrifty		Foals may be orphaned due to death of the mother due to starvation or dehydration.

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4 (No Action) *
	condition. Orphans encountered during gathers are cared for promptly and rarely die or have to be euthanized. Nearly all foals that would be gathered would be over four months of age and some would be ready for weaning from their mothers. In private industry, domestic horses are normally weaned between four and six months of age.		
Radio Collaring/Tagging	Based on numerous studies that have used modern radio collars with remote releases and tags to study the ecology of wild ungulates and equids, these devices have minimal effects on the animals wearing them. No effects are expected from the tags; however, it is possible that they may form an irritation to individuals should vegetation get tangled in the tail. In this case it is expected that the tag would ultimately rip out of the hair (leaving no injury) as the horse rubs it. Neck abrasions or sores have not been reported in studies where equids have been collared (e.g., Collins et al. 2014). A recent study that was just completed on the Frisco and Conger HMAs in Utah in November 2020 (not yet published) confirm the findings from the studies above. Applying this technology to the monitoring of free-roaming horses would provide the opportunity to better understand horse resource use, habitat preference, home range and movement patterns and can be incorporated into investigations of social structure and herd or band dynamics as well as behavioral		The use of collar and tag technology is critical to understanding how free-roaming horses move across the HMA and use increasingly scarce resources. Lack of this information has contributed to the management complexity of this species.

Impact	Alternatives 1 and 2	Alternative 3 (compared to 1&2)	Alternative 4 (No Action) *
	modifications associated with reproductive management including contraceptive use and sterilization. Such information can be used for future management decisions within the HMA.		
Transport	Potential impacts to individual horses can include stress, as well as slipping, falling, kicking, biting, or being stepped on by another animal. Unless wild horses are in extremely poor condition, it is rare for an animal to die during transport. Recently captured wild horses, generally mares, in very thin condition may have difficulty transitioning to feed. A small percentage of animals can die during this transition; however, some of these animals are in such poor condition that it is unlikely they would have survived if left on the range.		No impact.
Short-Term Holding, and Adoption Preparation	Mortality at short-term holding facilities averages approximately 5% (GAO-09-77, page 51), and includes animals euthanized due to a pre-existing condition, animals in extremely poor condition, animals that are injured and would not recover, animals which are unable to transition to feed; and animals which die accidentally during sorting, handling, or preparation.		

* The No Action Alternative would not meet the purpose and need and would violate the Wild Free-Roaming Horses and Burros Act, Federal Regulations, BLM/USFS policy and Resource Advisory Council Standards and Guidelines.

Alternatives 1 and 2 Additional Impacts

Population Growth Suppression Treatments

One-time application of Population growth suppression at the capture site would not affect normal development of a fetus should the mare already be pregnant when vaccinated, hormone health of the mare, or behavioral responses to stallions (Kirkpatrick et al, 1995). The vaccine has

also proven to have no apparent effect on pregnancies in progress, the health of offspring, or the behavior of treated mares (Turner et. al, 1997).

Mares receiving the vaccine would experience slightly increased stress levels associated with handling while being vaccinated and freeze marked. Serious injection site reactions associated with Population growth suppression treatments are rare in treated mares. Any direct impacts associated with Population growth suppression, such as swelling or local reactions at the injection site, would be minor in nature and of short duration. Most mares recover quickly once released back to the HMA, and none are expected to have long term impacts from the Population growth suppression injections.

Ransom et al. (2010) found no differences in how PZP-treated and control mares allocated their time between feeding, resting, travel, maintenance, and social behaviors in three populations of wild horses, which is consistent with Powell's (1999) findings in another population. Likewise, body condition of PZP-treated and control mares did not differ between treatment groups in Ransom et al.'s (2010) study. Turner and Kirkpatrick (2002) found that PZP-treated mares had higher body condition than control mares in another population, presumably because energy expenditure was reduced by the absence of pregnancy and lactation.

In two studies involving a total of four wild horse populations, both Nunez et al. (2009) and Ransom et al. (2010) found that PZP-treated mares were involved in reproductive interactions with stallions more often than control mares, which is not surprising given the evidence that PZP-treated females of other mammal species can regularly demonstrate estrus behavior while contracepted (Shumake and Wilhelm 1995, Heilmann et al. 1998, Curtis et al. 2002). Ransom et al. (2010) found that control mares were herded by stallions more frequently than PZP-treated mares, and Nunez et al. (2009) found that PZP-treated mares exhibited higher infidelity to their band stallion during the non-breeding season than control mares. Madosky et al. (in press) found this infidelity was also evident during the breeding season in the same population that Nunez et al. (2009) studied, resulting in PZP-treated mares changing bands more frequently than control mares. Long-term implications of these changes in social behavior are currently unknown.

CHAPTER 4. CONSULTATION AND COORDINATION

Public Involvement was initiated on this proposal by posting on the ePlanning website on May 6, 2020. Both Iron and Beaver county commissioners have been in contact with the BLM requesting the removal of excess wild horses from private and public lands to within AML. The counties requested the use of fertility treatment methods be used on wild horses to reduce future population growth of wild horses. The Beaver County Resource Management Plan (2017) states in Objective 2, "keep wild free-roaming horses at or below established AMLs in all HMAs in Beaver County." The Iron County Resource Management Plan states, "excess wild horses that exceed appropriate management levels must be removed to keep the fragile balance with other

uses." Additional request over the past two years for removal of wild horses from private and state lands have been received by the landowners adjacent to the Sulphur HMA.

As required by regulation [43 CFR 4740.1(b)], a public hearing was held in Cedar City, Utah on November 14, 2019 and will be held in subsequent years to discuss the use of helicopters and motorized vehicles in the management of Utah BLM's wild horses and burros. This meeting will be advertised in papers and radio stations statewide. This specific gather will be addressed at that public meeting as well as other gathers that may occur within the state of Utah over approximately the next 12 months. Similar meetings have been held each year in Utah since the passage of Federal Land Policy and Management Act of 1976.

A 30-day public comment period was offered beginning March 22, 2021. Comments received from the public meetings and comment period will be considered and, if applicable, will be addressed in management actions, NEPA documents, and decision documents using the most current direction from the National Wild Horse and Burro Program.

Persons, Groups, & Agencies Consulted

Name	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions
Utah State Historic Preservation Office (SHPO)	Consultation for undertakings, as required by the National Historic Preservation Act (NHPA) (16 USC 470)	No cultural resources would be affected. The project will be reviewed by SHPO as part of the quarterly submittal as per existing protocol.
Paiute Indian Tribe of Utah	Consultation as required by the American Indian Religious Freedom Act of 1978 (42 USC 1531) and NHPA (16 USC 1531)	In accordance with the Memorandum of Understanding between the Paiute Tribe of Utah and the BLM, this project does not require formal consultation.

List of Preparers

See the Interdisciplinary Team NEPA Checklist (Appendix 2).

CHAPTER 5. REFERENCES

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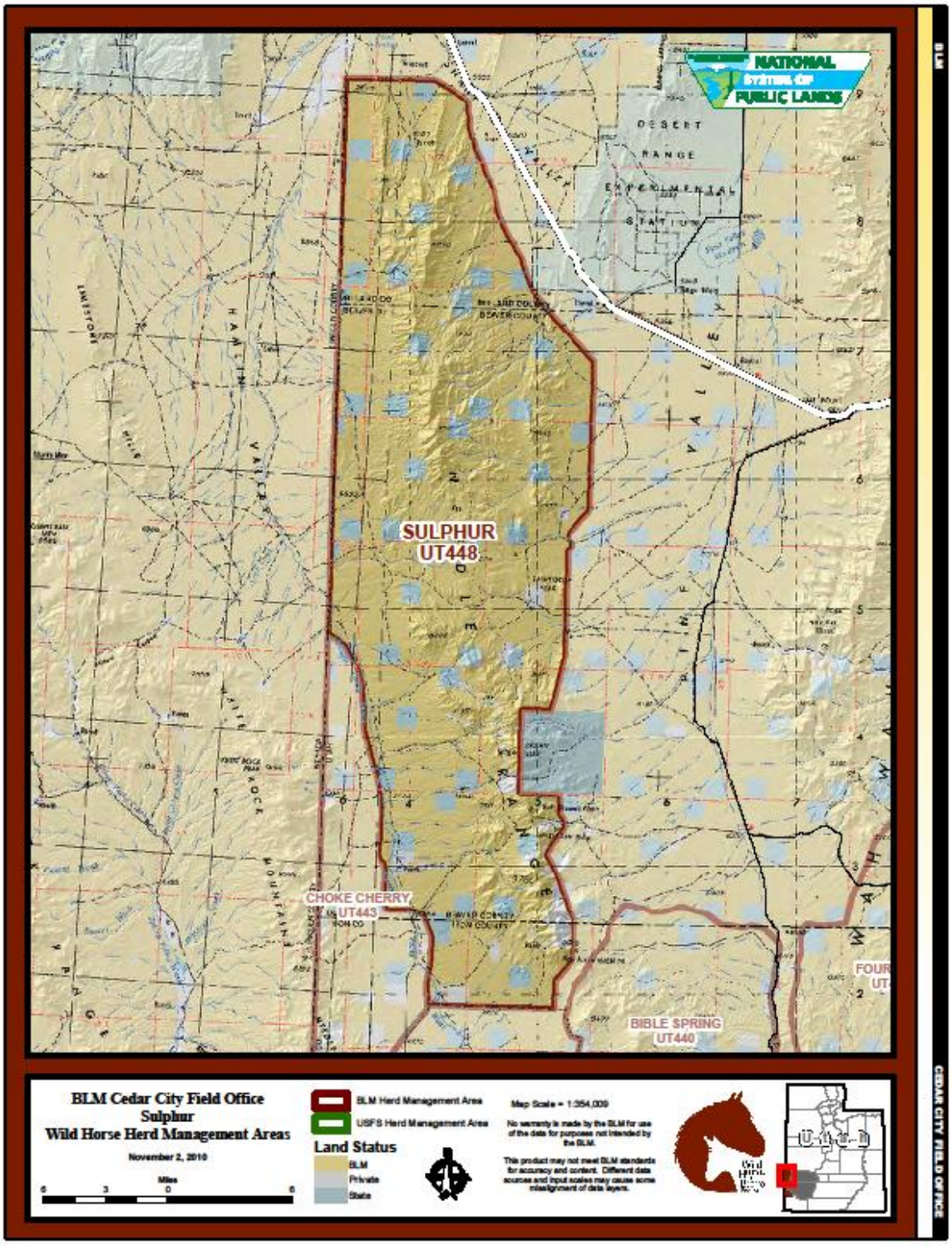
Appendices

Appendix 1. Map
Appendix 2. Interdisciplinary Team NEPA Checklist
Appendix 3. Additional Design Features
Appendix 4. Alternatives Considered but Not Analyzed in Detail
Appendix 5. Population Modeling
Appendix 6. Population Inventory

Appendix 1. Sulphur HMA Map



Appendix 2. Interdisciplinary Team NEPA Checklist

Project Title: Sulphur Wild Horse Gather Plan
NEPA Log Number: EA-UT-C010-2020-0029
Project Leader: Chad Hunter

DETERMINATION OF STAFF: ***(Choose one of the following abbreviated options for the left column)***

NP = not present in the area impacted by the proposed or alternative actions
NI = present, but not affected to a degree that detailed analysis is required
PI = present with potential for relevant impact that need to be analyzed in detail in the EA

RESOURCES AND ISSUES CONSIDERED:

Determi-nation	Resource	Rationale for Determination	Signature	Date
NI	Air Quality	Air quality in the area is good as is typical of relatively undeveloped areas of the western U.S. The area meets NAAQS. Nothing in the proposal would affect current conditions.	M. Bayles	3/10/20
NP	Areas of Critical Environmental Concern	There are no ACECs within the CCFO.	Dave Jacobson	3-5-2020
NI	Cultural Resources	This project is unlikely to have any effect on cultural resources. The trap and temporary holding locations will be located on an area of existing disturbance, such as road or a wash. The possibility of finding intact cultural resources in these areas is minimal to non-existent. If an existing disturbed area cannot be located for the temporary area, a cultural resource inventory will take place prior to the gather. If cultural resources are located during this inventory, the corral area will be moved to another location, which does not contain cultural resources.	R. Plank	3/4/2020
NI	Environmental Justice	No minority or economically disadvantaged groups would be affected.	C. Hunter	3/2/20
NP	Farmlands (Prime or Unique)	There is no soil survey completed for much of this area. There are likely soils in and adjacent to the herd unit capable of being prime or unique farmlands, however only when irrigation water is supplied. Where there is no irrigation water supplied, there are no prime or unique farmlands present.	M. Bayles	3/10/20
NI	Floodplains	The proposal would not affect the functioning of a floodplain; therefore, the action is consistent with Executive Order 11988.	E. Shotwell	4/01/2020
NI	Fuels/Fire Management	No impacts to fuels/fire management.	M. Esplin	3-4-2020
NI	Geology / Mineral Resources/Energy Production	The transient and superficial nature of the proposed gather activities would not substantially impact any mineral resources that may be present in the gather areas.	E Ginouves	3-3-20
NI	Greenhouse Gas Emissions	Releases of greenhouse gasses (GHG's), such as carbon monoxide, would occur because of operation of internal combustion engines being operated during the gather. The removal would occur in a very remote portion of Iron, Beaver and Millard counties and occur using improved county roads and lesser roads. Release of GHG's would be consistent with current levels of releases in the area and very short term.	M. Bayles	3/10/20

Determi-nation	Resource	Rationale for Determination	Signature	Date
PI	Hydrologic Conditions	Hydrologic conditions are variable throughout the Sulphur HMA, but in general are thought to be relatively good. Published soil survey data exists only for the extreme south end of the unit in Iron County. Otherwise, the only recent soil data that exists is unpublished data for parts of Beaver and Millard Counties. Fragile soils occur within the HMA. These are considered fragile primarily due to steep slopes. Field examination of some of the allotments during rangeland health evaluations revealed small areas with a moderate or higher departure from normal in soil stability. Excess numbers of horses are removing protective vegetative cover and are contributing to localized active gullying and overland flows. Soil compaction is a localized problem, especially where horses are trailing to and from water sources (ie Mountain Home Spring and Trough). See EA text under "soils" for more details.	M. Bayles	
PI/NI	Invasive Species/Noxious Weeds	Horses are contributing to the spread of the noxious weed hound's tongue within the HMA. Hound's tongue has been known to occur for the past ten years or so within the HMA and is closely associated with pinyon die-off and spread primarily via trailing by horses and elk. There would be a minimal decrease in this impact by reducing wild horse numbers to AML. Feeding certified weed free hay and avoiding weed infestation sites during gather operations. Noxious weed infestations are spread in part by the movement of animals, including livestock, by the transport of seed through physical contact and ingestion. The small, isolated noxious weed infestations should eventually be reduced in the future with the continuation of the noxious weed program which is implemented by the Cedar City Field Office. The Cedar City Field Office currently has an aggressive noxious weed control program and annually removes large quantities of noxious weeds throughout BLM administered lands in both Iron and Beaver counties. The BLM coordinates with County, State and Federal agencies to locate, treat and monitor noxious weed infestations throughout both counties. NI -As long as noxious weed stipulations are adhered to, there would be no impacts from this proposal.	J. Bulloch	3/02/2020
NI	Lands/Access	Any pending or authorized lands and realty actions in the wild horse gather area would not be substantially affected by the proposed action.	M. Campeau	3/11/2020
NI	Lands with Wilderness Characteristics	Placement of gather sites in previously disturbed areas, and along existing roads would ensure no impacts to areas which have wilderness characteristics. Inventory units identified as having wilderness characteristics within the Sulfur HMA are UT-C010-104 (Mountain Home South) and UT-C010-121 (Jackson Wash).	Dave Jacobson	3-5-2020
PI	Livestock Grazing	Livestock and wild horses compete directly for vegetative, water, and cover resources. Higher populations of wild horses mean more competition with livestock. Wild horse populations that are within AML reduce competition. When wild horse populations are above AML the livestock numbers must be reduced to not over utilize the vegetative and water resources.	M. Bayles	3-5-20
NI	Native American Religious Concerns	Past consultation with the PITU indicates that the tribes are generally not concerned about projects of this nature.	R. Plank	3/4/2020

Determi-nation	Resource	Rationale for Determination	Signature	Date
NI	Paleontology	The transient and superficial nature of the proposed gather activities would not substantially impact any paleontological resources that may be present in the gather areas.	E Ginouves	3-3-20
PI	Rangeland Health Standards	This is addressed as part of the rangeland heath/vegetation section of the EA and in other resource sections such as riparian.	M. Bayles	3/10/20
NI	Recreation	The proposed management and removal of excess wild horses would not impact the dispersed types of recreation which occur on the west desert which include hunting, OHV riding, camping and wildlife viewing.	Dave Jacobson	3-5-2020
NI	Socioeconomics	The proposed action will not in itself change the socioeconomics of the area.	G. Ginouves	3/10/2020
PI	Soils	Under the current situation of currently permitted livestock numbers, wildlife numbers being what they are and wild horses above AML, inadequate residual vegetation (forage) and litter remain on areas of grazing allotments within the analysis area (as evidenced by Rangeland Health Information). Lack of protective ground cover directly affects the soil's exposure to the erosive elements of wind and water. A reduction in horse numbers would allow additional vegetation to remain on these key areas, thus providing additional protection to the soil surface. For the purposes of the EA, hydrologic conditions and soils are combined.	M. Bayles	3/10/20
NI	Special Status Plants	Ostler's ivesia and Pink Egg Milkvetch are known to occur within the project area; However, due to the location and proximity of these species it is expected that there would be little to no impact associated with the proposed action. Ostler's ivesia occurs on steep terrain and large quartzite outcrops at 6400 – 7900 feet elevation. It is likely that wild horse traps/staging areas would not be located in these areas due to elevations and steep slopes at which they occur. Pink Egg Milkvetch is known to occur within the Sulphur HMA. This SSS Plant occurs in PJ, sagebrush, and mixed desert shrub communities at 5800 -7550 feet elevation. This special status species is has had recent survey work completed populations have been found in pinyon/jumiper stands that have limited access. It is not likely traps/staging areas would be located in these areas.	M. Bayles	3/10/20
PI	Vegetation	The proposed management and removal of excess wild horses would benefit vegetative communities.	C. Hunter	3/2/20
NI	Visual Resources	The proposed management and removal of excess wild horses would not impact the visual quality of the landscape and would conform to VRM objectives.	Dave Jacobson	3-5-2020
NI	Wastes (hazardous or solid)	The proposal should not produce any hazardous or solid wastes. Should any release occur, all State and Federal regulations shall be followed	T. Carlson	3/4/20
NI	Water Resources/Quality (drinking/surface/ground)	Project proposal would not substantially impact water quality. Project stipulations would minimize adverse impacts to water quality resulting from water trapping operations. It would be desirable to remove horses as soon as practical from any water trap areas. While surface waters in the herd management area are likely meeting water quality standards for most waters, a reduction in wild horse numbers would further improve water quality (sedimentation and fecal coliforms).	E. Shotwell	4/01/2020

Determi-nation	Resource	Rationale for Determination	Signature	Date
PI/NI	Wetlands/Riparian Zones	There are many inventoried riparian/wetland areas within the project area that show degradation due to excessive wild horse use. Reducing the number of horses to within appropriate AML's could allow recovery of wetlands/riparian areas. NI if: Project stipulations minimize impacts to wetland/riparian areas (ie 330 foot. buffers for trap sites near wetland/riparian zones).	E.Shotwell	4/01/2020
NP	Wild and Scenic Rivers	There are no wild and scenic river segments within the Sulphur HMA.	Dave Jacobson	3-5-2020
NI	Wilderness/WSA	The White Rock wilderness study area is within the project area boundary. Placement of gather sites in previously disturbed areas, and along existing roads would ensure no impacts to wilderness characteristics.	Dave Jacobson	3-5-2020
PI	Wild Horses	See main text in the EA.	C. Hunter	3/2/20
NI	Wildlife & Fish	The area contains year-long substantial mule deer and elk habitat (avoid Dec 1 – Apr 15 in harsh winters if possible) as well as crucial summer mule deer habitat. The area also contains year-long pronghorn habitat (avoid May 1 to Jun 30 for fawning).	D. Schaible	3/25/20
NI	Wildlife - Greater Sage-Grouse	The action alternatives are supported by MA-WHB-1, which states, "Manage HMAs in GRSG habitat within established appropriate management level ranges to achieve and maintain GRSG habitat objectives" and MA-WHB-3, which states, "Prioritize gathers and population growth suppression techniques in HMAs in GRSG habitat, unless removals are necessary in other areas to address higher priority environmental issues, including herd health impacts." The removal operations would not directly impact GRSG.	D. Schaible	3/1/21
NI	Wildlife – Migratory Birds	A variety of migratory bird species use the area and habitat within the Sulphur HMA, but they would not be affected to a degree that detailed analysis is required since the gather would be outside of migratory bird nesting season.	D. Christensen	3/6/2020
NI	Wildlife-Special Status (not TEC)	Sensitive species that may occupy the area include but are not limited to bald eagle, big free-tailed bat, burrowing owl, ferruginous hawk, fringed myotis, long-billed curlew, kit fox, pygmy rabbit, spotted bat, and Townsends big eared bat. Disturbance to these species should be minimal if traps/staging areas are placed in previously used areas. Follow BMP's for kit fox and pygmy rabbit if habitat is suspected within the trap site.	D. Schaible	3/25/20
NP	Wildlife T&E and Candidate	No T&E or Candidate species are known to be found within the HMA nor any of their critical habitat.	D. Christensen	3/4/2020
NI	Woodland / Forestry	This project will not have to any effect on woodland/forestry resources. The trap and temporary holding locations will be located on an area of existing disturbance, such as road or a wash. Trees will not be removed.	C. Peterson	4/27/2020

FINAL REVIEW:

Reviewer Title	Signature	Date	Comments
Environmental Coordinator			

Determi-nation	Resource	Rationale for Determination		Signature	Date
Authorized Officer					

Appendix 3. Additional Design Features

National Selective Removal Policy

- Gather operations would be conducted in accordance with the Comprehensive Animal Welfare Program (CAWP) and/or the National Wild Horse Gather Contract as adjusted or amended through the National and State wild horse and burro program direction. These documents can be found here: https://eplanning.blm.gov/eplanning-ui/project/1505407/510.
- When gather objectives require gather efficiencies of 50-80% or more of the animals to be captured from multiple gather sites (traps) within the HMA, the helicopter drive method and helicopter assisted roping from horseback will be the primary gather methods used. Post-gather, every effort will be made to return released animals (if any) to the same general area from which they were gathered.
- Given a summer or early fall gather window, bait and/or water trapping may be used provided the gather operations timeframe is consistent with current animal and resource conditions. Bait and/or water trapping may also be selected as the primary method to maintain the population within AML and other special circumstances as appropriate.
- An Animal and Plant Inspection Service (APHIS) or other licensed veterinarian may be on-site during gathers, as needed, to examine animals and make recommendations to BLM for care and treatment of wild horses. Decisions to humanely euthanize animals in field situations will be made in conformance with BLM policy.
- Removal priorities will follow the *Washington Office IM 2010-135, Gather Policy and Selective Removal Criteria and Management Considerations for Reducing Population Growth Rates:*
  a). *Age Class -Four Years and Younger:* Wild horses 4 years of age and younger should be the first priority for removal and placement into the national adoption program.
  b). *Age Class – Eleven to Nineteen Years Old:* Wild horses aged 11 to 19 years of age should be removed from the HMA only if management goals and objectives for the herd cannot be achieved by removing horses 4 years and younger or if specific exceptions prevent them from being turned back and left on the range.
  c). *Age Class – Five to Ten Years Old:* Wild horses 5 to 10 years of age are the lowest priority for removal and should be removed only if management goals and objectives for the herd cannot be achieved through the removal of animals identified in a) and b) above.
  d). *Age Class – Twenty Years and Older:* Wild horses 20 years and older should not be removed from an HMA unless specific exceptions prevent them from being turned back and left on the range. In general, this age group can survive on the HMA but can have greater difficulty adapting to captivity and the stress of handling and shipping if removed.
- Any horses or burros gathered and determined, with consultation between BLM and Utah State brand inspectors, to be domestic animals will be turned over to the local brand inspector in accordance with state law. This is in accordance with the Cooperative Agreement between The Department of Agriculture, State of Utah and the Utah State Office, BLM approved January of 2001.

- Decisions to humanely euthanize animals in field situations will be made in conformance with BLM policy (Washington Office Instruction Memorandum 2009-041) or current policy.
- Excess animals would be transported to a BLM facility where they would be cared for in accordance with the WFRHBA, most current regulations and policies (i.e., prepared (freeze-marked, vaccinated and de-wormed) for adoption, sale or long-term holding).

Temporary Holding Facilities During Gathers

Wild horses gathered would be transported from the trap sites to a temporary holding corral near the HMA in goose-neck trailers or straight-deck semi-tractor trailers. At the temporary holding corral, the wild horses will be aged and sorted into different pens based on sex. The horses would be provided an ample supply of good quality hay and water. Mares and their un-weaned foals would be kept in pens together. All horses identified for retention in the HMA would be penned separately from those animals identified for removal as excess. All mares identified for release would be treated with Population growth suppression vaccine.

At the temporary holding facility, a veterinarian, when present, would provide recommendations to the BLM regarding care, treatment, and if necessary, euthanasia of the recently captured wild horses. Any animals affected by a chronic or incurable disease, injury, lameness or serious physical defect (such as severe tooth loss or wear, club foot, and other severe congenital abnormalities) would be humanely euthanized using methods acceptable to the American Veterinary Medical Association (AVMA).

Transport, Short-Term Holding, and Adoption Preparation

Wild horses removed from the range as excess would be transported to the receiving short-term holding facility in a goose-neck stock trailer or straight-deck semi-tractor trailers. Trucks and trailers used to haul the wild horses would be inspected prior to use to ensure wild horses could be safely transported. Wild horses would be segregated by age and sex when possible and loaded into separate compartments. Mares and their un-weaned foals may be shipped together depending on age and size of foals. Mare and un-weaned foals would not be separated for longer than 12 hours. Transportation of recently captured wild horses would be limited to a maximum of 8 hours.

Upon arrival, recently captured wild horses would off-loaded by compartment and placed in holding pens where they would be fed good quality hay and water. Most wild horses begin to eat and drink immediately and adjust rapidly to their new situation. At the short-term holding facility, a veterinarian would provide recommendations to the BLM regarding care, treatment, and if necessary, euthanasia of the recently captured wild horses. Any animals affected by a chronic or incurable disease, injury, lameness, or serious physical defect (such as severe tooth loss or wear, club foot, and other severe congenital abnormalities) that was not diagnosed previously at the temporary holding corrals at the gather site would be humanely euthanized using methods acceptable to the AVMA. Wild horses in very thin condition or animals with injuries are sorted and placed in hospital pens, fed separately and/or treated for their injuries. Recently captured wild horses, generally mares, in very thin condition may have difficulty transitioning to feed. A small percentage of animals can die during this transition; however,

some of these animals are in such poor condition that it is unlikely they would have survived if left on the range. At short-term corral facilities, a minimum of 700 square feet is provided per animal.

After recently captured wild horses have transitioned to their new environment, they are prepared for adoption or sale. Preparation involves freeze-marking the animals with a unique identification number, vaccination against common diseases, castration, and de-worming.

Public Participation

- Prior to conducting a gather a communications plan or similar document summarizing the procedures to follow when media or interested public request information or viewing opportunities during the gather should be prepared.
- The public must adhere to guidance from the agency representative and viewing must be prearranged.

Safety

- Safety of BLM employees, contractors, members of the public, and the wild horses will be given primary consideration.
- A briefing between all parties involved in the gather will be conducted each morning.
- All BLM personnel, contractors and volunteers will wear protective clothing suitable for work of this nature. BLM will alert observers of the requirement to dress properly (see Wild Horse and Burro Operational Hazards, BLM File 4720, UT-067). BLM will assure that members of the public are in safe observation areas. Observation protocols and ground rules will be developed for the public and will be enforced to keep both public and BLM personal in a safe environment.
- The handling of hazardous, or potentially hazardous materials such as liquid nitrogen and vaccination needles will be accomplished in a safe and conscientious manner by BLM personnel or the contract veterinarian.

Responsibility and Lines of Communication

- The local WH&B Specialist / Project Manager from the CCFO, have the direct responsibility to ensure make sure that Instruction Memorandum # 2013-060 Wild Horse and Burro Gather: Management by Incident Command System is followed.
- Gather Research Coordinator (GRC) from the CCFO, will have the direct responsibility to ensure compliance with all data collection and sampling. The GRC will also ensure appropriate communication with Field Office Manager, WO260 National Research Coordinator, College of Veterinary Medicine at Texas A&M University, and Animal Plant Health Inspection Service (APHIS).
- The CCFO Assistant Manager will take an active role to ensure the appropriate lines of communication are established between the field, Field Office, State Office, Salt Lake Regional Wild Horse Corrals and Delta Wild Horse Corrals.
- All employees involved in the gathering operations will keep the best interests of the animals at the forefront at all times.

Appendix 4. Alternatives Considered but Not Analyzed in Detail

Population Growth Suppression without Removals

This alternative would not allow for population regulation by removing wild horses to achieve AML on the Sulphur HMA. Wild horse management under this alternative would involve inoculating mares with PZP or other population growth suppression vaccines as outlined above. Gather, data collection, and handling techniques would be followed in accordance with the proposed action. Mares inoculated during the winter of 2015/2016 and other years the vaccine was administered would foal normally in the spring following treatment. Reproduction would be limited the following year or years after treatment.

In addition to not meeting the selection criteria for implementing population growth suppression research, this alternative was eliminated from further consideration due to the inability to achieve population objectives. The current population within the Sulphur HMA exceeds the AML as established in the Pinyon MFP, Warm Springs Resource Area RMP and the Sulphur Wild Horse Herd Management Area Plan. Implementing population growth suppression without removing wild horses would not address the immediate issue of achieving AML. Population modeling shows that using this alternative with the current immunocontraceptive available would not control the population of wild horses and would not be in conformance with the WFRHBA, Pinyon MFP, Warm Springs Resource Area RMP and the Sulphur Wild Horse Herd Management Area Plan. The WFRHBA mandates the BLM to prevent the range from deterioration associated with overpopulation and preserve and maintain a thriving natural ecological balance in consideration with multiple use relationships.

Removal or Reduction of Livestock within the HMA

This alternative would involve no removal of wild horses and instead address the impacts from excess wild horse numbers through the removal or reduction of livestock within the HMA. This alternative was not brought forward for detailed analysis because it is inconsistent with multiple use management, as required by FLPMA, the Pinyon MFP, Warm Springs Resource Area RMP, Sulphur Wild Horse Herd Management Area Plan and the Wild Horse and Burro Act, which directs the Secretary to immediately remove excess wild horses. Available data also indicates that wild horse use – including where livestock use has been excluded – has resulted in excessive vegetative utilization and impacts to rangelands that are recovering from wildfire or where fuels reduction treatments have been completed. Reduction and/or removal of livestock alone would not achieve utilization and vegetative objectives, as excess wild horses would continue to impact these areas that have not received livestock use for 2 to 10 years.

Livestock grazing can only be reduced on permits following the process outlined in the regulations found at 43 CFR Part 4100. Several reductions and changes have been made to livestock grazing within allotments associated with the Sulphur HMA through this process. The elimination of livestock grazing in an area would require an amendment to the land use plans, which is out of the scope of this analysis. Such changes to livestock grazing cannot be made through a wild horse gather decision.

Livestock permit renewals were completed from 2007 to 2014 on the allotments within and adjacent to the Sulphur HMA. Each of these renewals had environmental assessments and decision records completed. These decisions established stocking rates for livestock, established seasons of use, areas of use, kind and class of livestock and management actions to improve livestock distribution. These management actions included the establishment of grazing systems, allowable use levels, salting and herding practices. Some livestock reductions were made in these decisions on allotments within the Sulphur HMA. Livestock grazing continues to be evaluated for allotments and use areas within the Sulphur HMA. Monitoring and evaluation of livestock grazing is in accordance with the Pinyon MFP's Rangeland Program Summary Section IV, 17.

The BLM is currently authorized to remove livestock from the HMA, "if necessary, to provide habitat for wild horses or burros, to implement herd management actions, or to protect wild horses or burros from disease, harassment or injury" under CFR 4710.5. This authority is usually applied in cases of emergency and not for general management of wild horses or burros in a manner that would be inconsistent with the land use plan and the separate decisions establishing the appropriate levels of livestock grazing and wild horse use, respectively.

Gather Wild Horses to the AML Upper Limit

A post-gather population size at the upper level of the AML range would result in the AML being exceeded the next foaling season. This would be unacceptable for several reasons. The AML represents "that 'optimum number' of wild horses which results in a thriving natural ecological balance and avoids a deterioration of the range" (Animal Protection Institute, 109 IBLA 119;1989). The Interior Board of Land Appeals (IBLA) has also held that, "Proper range management dictates removal of horses before the herd size causes damage to the rangeland. Thus, the optimum number of horses is somewhere below the number that would cause resource damage" (Animal Protection Institute, 118 IBLA 63, 75; 1991).

The upper level of the AML established within a HMA represents the maximum population at which a thriving natural ecological balance would be maintained. The lower level represents the number of animals to remain in a HMA following a wild horse gather, to allow for a periodic gather cycle, and to prevent the population from exceeding the established AML between gathers.

Additionally, gathering to the upper range of AML would result in the need to follow up with another gather within one year (with resulting stress on the wild horse population), and could result in overutilization of vegetation resources and damage to the rangeland if the BLM were unable to gather the excess horses in the HMA on an annual basis. This alternative would not reduce the wild horse population growth rate of 20 percent in the HMA and the BLM would not be able to conduct periodic gathers and still maintain a thriving natural ecological balance. For these reasons, this alternative did not receive further consideration in this document.

Raising the Appropriate Management Levels for Wild Horses

This alternative was not brought forward for detailed analysis because it would be outside of the scope of the analysis and would be inconsistent with the WFRHBA which directs the Secretary to immediately remove excess wild horses and to manage for a thriving natural ecological balance and for multiple uses. The AML was last reevaluated in the Sulphur Herd Management Plan and there is no basis for modifying the AML at this time. Available data shows that excess wild horses are present on the range, that excess horses need to be removed, and that there is insufficient water and forage within the HMA to support an increase in the wild horse AML. Given the resource degradation occurring with the current overpopulation of wild horses, it is necessary to bring the population back to AML first so the agency can collect data that would help inform whether the range could support additional horses above AML while still ensuring a thriving natural ecological balance. Given the absence of data that would support a modification to the AML, this gather decision is not an appropriate mechanism for adjusting AML.

Population Growth Suppression Treatment Only Including Using Bait/Water Trapping To Dart Mares with PZP Remotely (No Removal)

Population modeling was completed to analyze the potential impacts associated with conducting gathers about every 3 years over the next 10-year period to treat captured mares with population growth suppression. Under this alternative, no excess wild horses would be removed. The use of bait or water trapping would still not remove excess wild horses. While the average population growth would be reduced, AML would not be achieved and the damage to the range associated with wild horse overpopulation would continue. This alternative would not meet the Purpose and Need for the Action and would be contrary to the WFRHBA.

The use of remote darting to administer PZP within the HMA where the horses are not accustomed to human activity has been shown to be very difficult. In the Cedar Mountain HMA during a two-year study where administration of PZP by remote darting was to occur, not a single horse was successfully darted. This method has been effective in some HMAs where the wild horses are more approachable, but the Sulphur HMA is not such an area.

Bait or Water Trap Only

An alternative considered but eliminated from detailed analysis was use of bait and/or water trapping as the primary gathering method. The use of bait and water trapping, though effective in specific areas and circumstances, would not be timely, cost-effective or practical as the primary gather method for this HMA due to the size of the area, the remoteness of many of the water sources and large number of horses that would need to be captured. However, water or bait trapping may be used to achieve the desired goals of alternatives 1 and 2 if gather efficiencies are too low using a helicopter, a helicopter gather cannot be scheduled, or to help maintain AML once achieved. This alternative was dismissed from detailed study as a primary gather method for the following reasons: (1) the project area is too large to effectively use this gather method; (2) road access for vehicles to potential trapping locations necessary to get equipment in/out as well as to safely transport gathered wild horses is limited; (3) the presence of scattered water sources on both private, state and public lands inside and outside the HMA

would make it almost impossible to restrict wild horse access to the extent necessary to effectively gather and remove the excess animals through bait and/or water trapping to achieve management goals; and (4) the large number of horses that would need to be captured within a year period using only this method requires logistical resource (panels, trucks, trailers, personal etc.) that are not available to the local or state BLM.

Controlling Wild Horse Numbers by Natural Means

This alternative was eliminated from further consideration because it is contrary to the WFRHBA which requires the BLM to prevent the range from deterioration associated with an overpopulation of wild horses. It is also inconsistent with the Pinyon MFP, which directs the BLM to conduct gathers as necessary to achieve and maintain the AML. The alternative of using natural controls to achieve a desirable AML has not been shown to be feasible in the past. Wild horses in the Sulphur HMA are not substantially regulated by predators. In addition, wild horses are a long-lived species with documented foal survival rates exceeding 95% and they are not a self-regulating species. This alternative would result in a steady increase in numbers which would continually exceed the carrying capacity of the range until severe and unusual conditions that occur periodically-- such as blizzards or extreme drought-- caused catastrophic mortality of wild horses (See Appendix 5, Population Modeling).

Gather and Release Excess Wild Horses Every Two Years and Apply Two-Year PZP to Horses for Release.

Another alternative considered was to gather a substantial portion of the existing population (90%) and implement Population growth suppression treatment only, without removal of excess horses was modeled using a two-year gather/treatment interval over a 10-year period. The effectiveness of the 22-month PZP is somewhat in question based on the most recent pen trials. However, for the modeling a percent effectiveness of 94% the first year, 82% the second, and 68% the third year was used. Based on WinEquus population modeling (See Appendix 5), this alternative would not result in attainment of AML for the HMA. The wild horse population would continue to have an average population growth rate of 6.9% to 12.1% adding to the current wild horse overpopulation, albeit at a slower rate of growth than the No Action Alternative.

The modeling reflected an average population size in 11 years of 1363 to 2516 wild horses under a two-year treatment interval. In 90% of the trials, this alternative would not decrease the existing overpopulation of wild horses, resource concerns and rangeland deterioration would continue, and implementation would result in substantially increased gather and population growth suppression costs relative to the alternatives that remove excess wild horses to the AML range. In addition to not achieving AML, the time needed to complete a gather would also increase over time, because the more frequently an area is gathered, the more difficult wild horses are to trap. They become very evasive and learn to evade the helicopter by taking cover in treed areas and canyons. Wild horses would also move out of the area when they hear a helicopter, thereby further reducing the overall gather efficiency. The horses would also become so wary of traps used in water or bait traps that they would avoid any waters where traps are or were set up. Frequent gathers would increase the stress to wild horses, as

individuals and as entire herds. It would become increasingly more difficult over time to repeat gathers every two years to successfully treat a large portion of the population. For these reasons, this alternative was dropped from detailed study.

Make Individualized Excess Wild Horse Determinations Prior to Removal

An alternative whereby BLM would make on-the-ground and individualized excess wild horse determinations prior to removal of wild horses from any HMA has been advocated by some members of the public. Under the view set forth in some comments during public commenting for wild horse gathers nationwide, a tiered or phased removal of wild horses from the range is mandated by the WFRHBA[1]. Specifically, this alternative would involve a tiered gather approach, whereby BLM would first identify and remove old, sick or lame animals in order to euthanize those animals on the range prior to gather. Second, BLM would identify and remove wild horses for which adoption demand exists, e.g., younger wild horses or wild horses with unusual and interesting markings. Under the WFRHBA (1333(b)(2)(iv)(C)), BLM would then sell or destroy any additional excess wild horses for which adoption demand does not exist in the most humane and cost-effective manner possible, although euthanasia and sale without limitations are currently limited by Congressional appropriations.

This proposed alternative could be viable in situations where the project area is contained, the area is readily accessible and wild horses are clearly visible, and where the number of wild horses to be removed is so small that a targeted approach to removal can be implemented. However, under the conditions present within the gather area and the significant number of excess wild horses both inside and outside of the HMA, this proposed alternative is impractical, if not impossible, as well as less humane for a variety of reasons.

First, BLM does euthanize old, sick, or lame animals on the range when such animals have been identified. This occurs on an on-going basis and is not limited to wild horse gathers. During a gather, if old, sick, or lame animals are found and it is clear that an animal's condition requires the animal to be put down, that animal is separated from the rest of the group that is being herded so that it can be euthanized on the range. However, wild horses that meet the criteria for humane destruction because they are old, sick, or lame usually cannot be identified as such until they have been gathered and examined up close, e.g., to determine whether the wild horses have lost all their teeth or are club footed. Old, sick, and lame wild horses meeting the criteria for humane euthanasia are also only a small fraction of the total number of wild horses to be gathered, comprising on average about 0.5% of gathered wild horses. Thus, in a gather of over 1,000 wild horses, potentially about five of the gathered wild horses might meet the criteria for humane destruction over an area of over a quarter of a million acres.

Due to the size of the gather area, access limitations associated with topographic and terrain features and the challenges of approaching wild horses close enough to make an individualized

[1] The view that the WFRHBA requires a tiered removal process has been litigated and rejected by Federal courts. See *In Defense of Animals v. Salazar*, 675 F. Supp. 2d 89, 97-98 (D.D.C. 2009); *In Defense of Animals v. United States DOI*, 909 F. Supp. 2d 1178, 1190-1191 (E.D. Cal. 2012), aff'd 751 F.3d 1054, 1064-1065 (9th Cir. 2014).

determination of whether a wild horse is old, sick, or lame, it would be virtually impossible to conduct a phased culling of such wild horses on the range without actually gathering and examining the wild horses. Similarly, rounding up and removing wild horses for which an adoption demand exists, before gathering any other excess wild horses, would be both impractical and much more disruptive and traumatic for the animals. Recent gathers have had success in adopting out approximately 30% of excess wild horses removed from the range on an annual basis. The size of the gather area, terrain challenges, difficulties of approaching the wild horses close enough to determine age and whether they have characteristics (such as color or markings) that make them more adoptable, the impracticalities inherent in attempting to separate the small number of adoptable wild horses from the rest of the herd, and the impacts to the wild horses from the closer contact necessary, makes such phased removal a much less desirable method for gathering excess wild horses. This approach would create a significantly higher level of disruption for the wild horses on the range and would also make it much more difficult to gather the remaining excess wild horses.

Furthermore, if BLM plans to apply any population controls to gathered wild horses prior to release, it would be necessary to gather more than just the excess wild horses to be removed, making this type of phased approach completely unnecessary and counterproductive.

Making a determination of excess as to a specific wild horse under this alternative, and then successfully gathering that individual wild horse would be impractical to implement (if not impossible) due to the size of the gather area, terrain challenges and difficulties approaching the wild horses close enough to make an individualized determination. This tiered approach would also be extremely disruptive to the wild horses due to repeated culling and gather activities over a short period of time. Gathering excess wild horses under this alternative would greatly increase the potential stress placed on the animals due to repeated attempts to capture specific animals and not others in the band. This in turn would increase the potential for injury, separation of mare/foal pairs, and possible mortality.

This alternative would be impractical to implement (if not impossible), would be cost-prohibitive, and would be unlikely to result in the successful removal of excess wild horses or application of population controls to released wild horses. This approach would also be less humane and more disruptive and traumatic for the wild horses. This alternative was therefore eliminated from any further consideration.

Use of Gelding as Non-reproductive Population to Reduce Population Growth Rate

A non-reproductive population of gelding was excluded from further consideration at this time due to there being more effective ways to adequately reduce the female horse fertility rates within the HMA. By itself, it is unlikely that sterilization (gelding) would allow the BLM to achieve its horse and burro population management objectives since a single stallion is capable of impregnating multiple mares, and stallions other than the dominant harem stallion may also breed with some mares. Therefore, to be fully effective, use of sterilization to control population growth requires that either the entire male population be gathered and treated (which is not practical) or that some percentage of the female wild horses/burros in the

population be gathered and treated. If the treatment is not of a permanent nature (e.g., application of the PZP-22 vaccine to mares) the animals would need to be gathered and treated on a cyclical basis.

Allow Public to Capture and Remove Wild Horses
An alternative using members of the public to gather wild horses through a permitting process was suggested by the public. This alternative was eliminated from further consideration because it is contrary to the WFRHBA.

The WFRHBA placed all wild free-roaming horses and burros that occur on public lands to be under the jurisdiction of the Secretary of the Interior and Secretary of Agriculture for the purpose of management and protection in accordance with the provisions of that Act. It places penalties on members of the public that willfully removes or attempts to remove a wild free-roaming horse or burro from the public lands, without authority. The WFRHBA would need to be changed to allow this type of alternative. An administrative process to implement this alternative, which currently does not exist, would need to be developed. For these reasons, this alternative was eliminated from further consideration.

Use Alternative Capture Techniques Instead of Helicopters to Capture Excess Wild Horses
An alternative using capture methods other than helicopters and bait/water trapping was suggested by the public. As no specific alternative methods were suggested, the BLM identified chemical immobilization, net gunning, and wrangler/horseback drive trapping as potential methods for gathering horses. Net gunning techniques normally used to capture big game also rely on helicopters. Chemical immobilization is a very specialized technique and strictly regulated. Currently, the BLM does not have sufficient expertise to implement either of these methods and they would be impractical to use given the size of the Sulphur HMA, access limitations and approachability of the horses.

Use of wrangler on horseback drive-trapping to remove excess wild horses can be fairly effective on a very small scale, but due to the number of excess horses to be removed, the large geographic size of the Sulphur HMA, access limitations and approachability of the horses this technique would be ineffective and impractical. Horseback drive-trapping is also very labor intensive and can be very harmful to the domestic horses and the wranglers used to herd the wild horses. For these reasons, this alternative was eliminated from further consideration.

Summary
The alternatives being addressed in this document cover a reasonable range of alternatives for meeting the purpose and need. No other alternatives have been developed by the public or the Cedar City Field Office staff at this time.

Appendix 5. Population Modeling

Sulphur HMA 2021 Population Modeling

To complete the population modeling for the Sulphur HMA, version 1.40 of the WinEquus program, created April 2, 2002, was utilized.

Objectives of Population Modeling

Review of the data output for each of the simulations provided many use full comparisons of the possible outcomes for each alternative. Some of the questions that need to be answered through the modeling include:

- Do any of the Alternatives "crash" the population?
- What effect does Population growth suppression have on population growth rate?
- What effects do the different alternatives have on the average population size?
- What effects do the different alternatives have on the genetic health of the herd?

Population Data, Criteria, and Parameters utilized for Population Modeling
All simulations used the survival probabilities, foaling rates, and sex ratio at birth that was supplied with the Winn Equus population for the Garfield HMA.

Sex ratio at Birth: 42% Females; 58% Males

The following percent effectiveness of Population growth suppression was utilized in the population modeling for Alternative I: Year 1: 94%

The following table displays the contraception parameters utilized in the population model for Proposed Alternative:

Contraception Criteria

Age	Percentages for Fertility Treatment
1	100%
2	100%
3	100%
4	100%
5	100%
6	100%

Age	Percentages for Fertility Treatment
7	100%
8	100%
9	100%
10-14	100%
15-19	100%
20+	100%

Population Modeling Criteria

The following summarizes the population modeling criteria that are common to the Proposed Action and all alternatives:

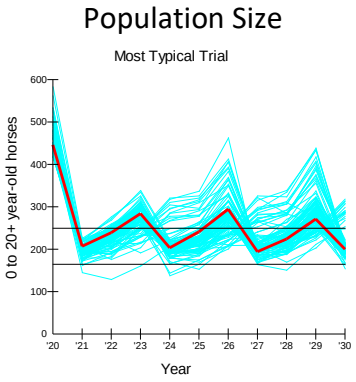
- Starting year: 2021
- Initial Gather Year: 2021
- Gather interval: regular interval of three years
- Gather for fertility treatment regardless of population size: Yes
- Continue to gather after reduction to treat females: Yes
- Sex ratio at birth: 58% males
- Percent of the population that can be gathered: 80%
- Minimum age for long-term holding facility horses: Not Applicable (Gate Cut)
- Foals are included in the AML
- Simulations were run for 10 years with 100 trials each.

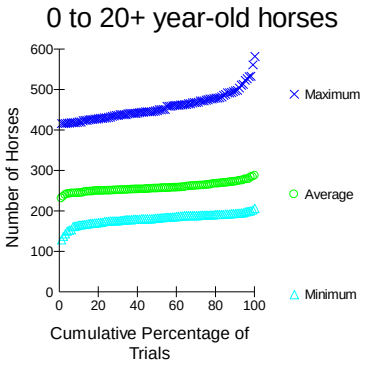
The following table displays the population modeling parameters utilized in the model:

Population Modeling Parameters Modeling Parameter	Alternatives 1 and 2: Proposed Action- Gather and Removal of Excess Wild Horses and Application of Population Growth Suppression	Alternative 2: Gather and Removal of Excess Wild Horses without Population Growth Suppression.	Alternative 3: No Action – Continue Existing Management. No Gather and Removal
Management by removal only	No	Yes	No
Threshold Population Size Following Gathers	165	165	N/A
Target Population Size Following Gathers	165	165	N/A

Population Modeling Parameters Modeling Parameter	Alternatives 1 and 2: Proposed Action- Gather and Removal of Excess Wild Horses and Application of Population Growth Suppression	Alternative 2: Gather and Removal of Excess Wild Horses without Population Growth Suppression.	Alternative 3: No Action – Continue Existing Management. No Gather and Removal
Gather for Population Growth Suppression regardless of population size	Yes	No	N/A
Gather continue after removals to treat additional females	Yes	Yes	N/A
Effectiveness of Population Growth Suppression: Year 1	94%	N/A	N/A

Results Alternative 1 and 2: Proposed Action –Gather and Removal of Excess Wild Horses and Application of Population Growth Suppression.



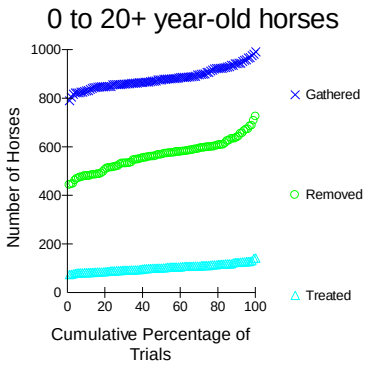


Population Sizes in 11 Years*

	Minimum	Average	Maximum
Lowest Trial	129	231	417
10th Percentile	166	245	421
25th Percentile	176	250	432
Median Trial	183	256	450
75th Percentile	190	265	476
90th Percentile	194	273	498
Highest Trial	207	288	583

* 0 to 20+ year-old horses

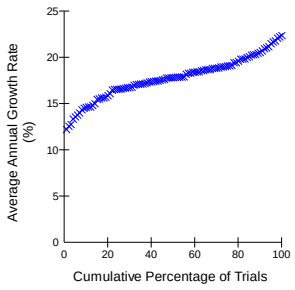
In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 129 and the highest was 583. In half the trials, the minimum population size in 11 years was less than 183 and the maximum was less than 450. The average population size across 11 years ranged from 231 to 288.



Totals in 11 Years*

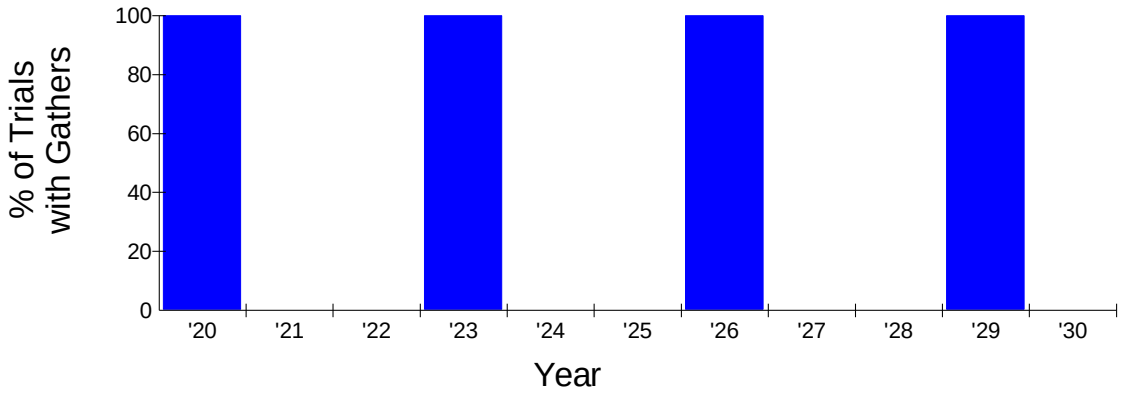
	Gathered	Removed	Treated
Lowest Trial	791	444	75
10th Percentile	832	480	83
25th Percentile	858	519	90
Median Trial	878	570	102
75th Percentile	911	600	113
90th Percentile	945	641	125
Highest Trial	993	726	143

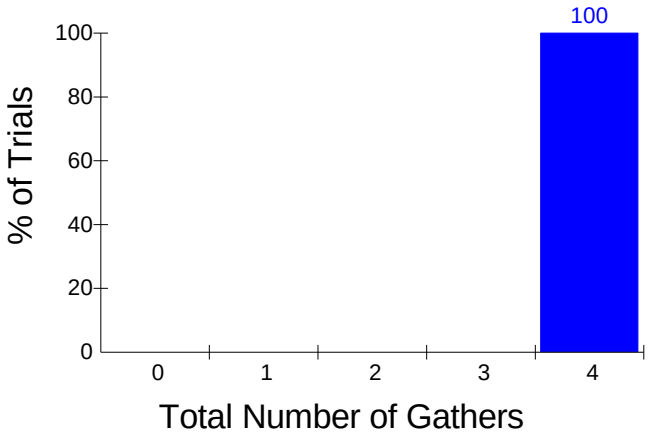
* 0 to 20+ year-old horses



Average Growth Rate in 10 Years

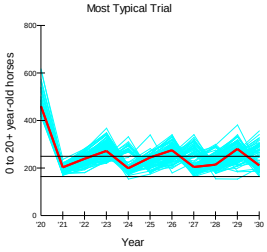
Lowest Trial	12.2
10th Percentile	14.6
25th Percentile	16.6
Median Trial	17.9
75th Percentile	19.1
90th Percentile	20.6
Highest Trial	22.4

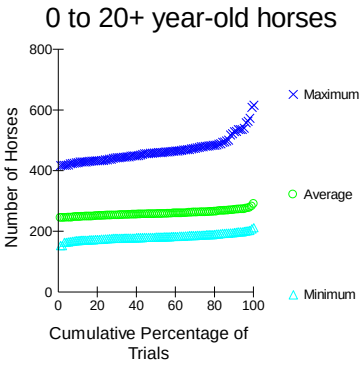




Results Alternative 3: Gather and Removal of Excess Wild Horses without Population Growth Suppression

Population Size



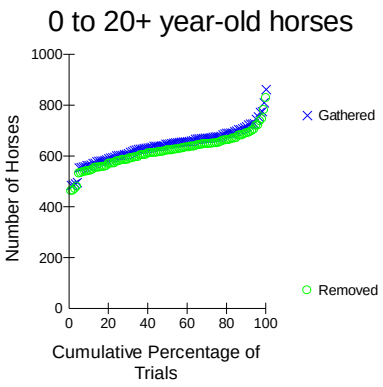


Population Sizes in 11 Years*

	Minimum	Average	Maximum
Lowest Trial	154	245	418
10th Percentile	170	248	429
25th Percentile	176	253	438
Median Trial	182	258	460
75th Percentile	190	264	482
90th Percentile	198	272	530
Highest Trial	213	291	617

* 0 to 20+ year-old horses

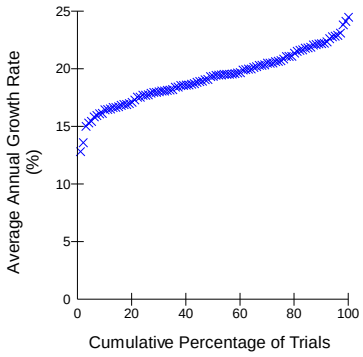
In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 154 and the highest was 617. In half the trials, the minimum population size in 11 years was less than 182 and the maximum was less than 460. The average population size across 11 years ranged from 245 to 291.



Totals in 11 Years*

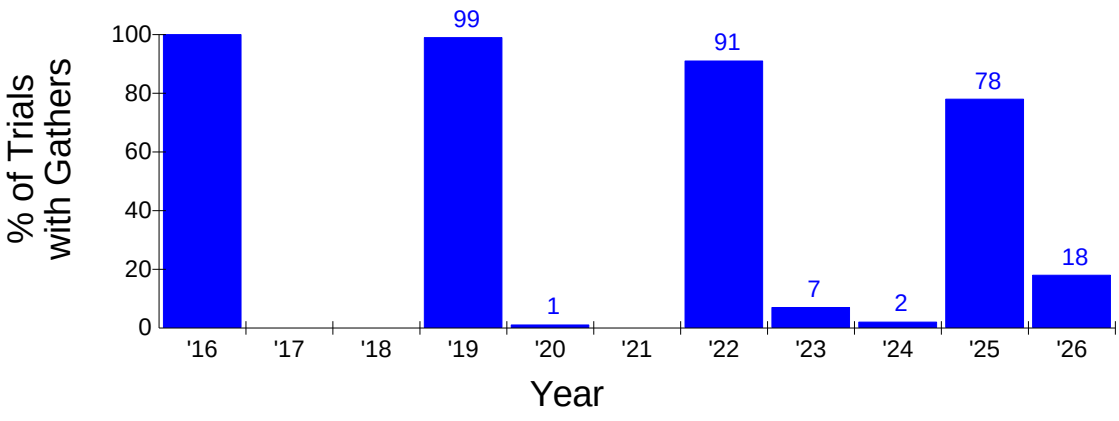
	Gathered	Removed
Lowest Trial	486	463
10th Percentile	565	542
25th Percentile	604	581
Median Trial	648	623
75th Percentile	677	652
90th Percentile	720	691
Highest Trial	863	829

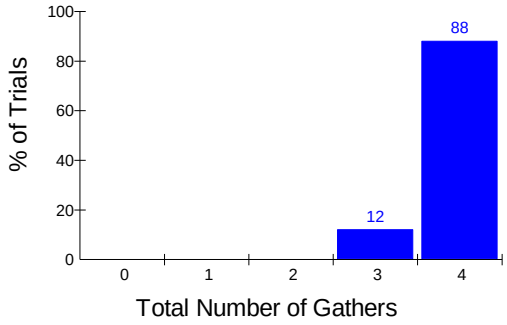
* 0 to 20+ year-old horses



Average Growth Rate in 10 Years

Lowest Trial	12.8
10th Percentile	16.5
25th Percentile	17.8
Median Trial	19.4
75th Percentile	20.8
90th Percentile	22.2
Highest Trial	**24.5**

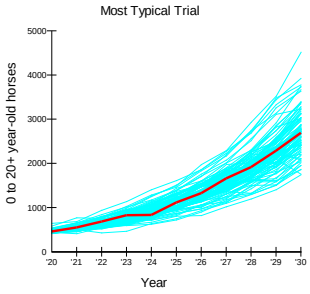


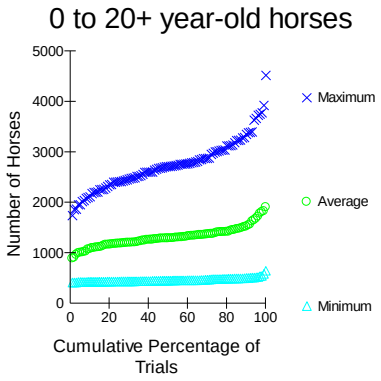


Results Alternative 4: No Action – No Gather, Removal or use of Population Growth Suppression

Results - No Action

Population Size



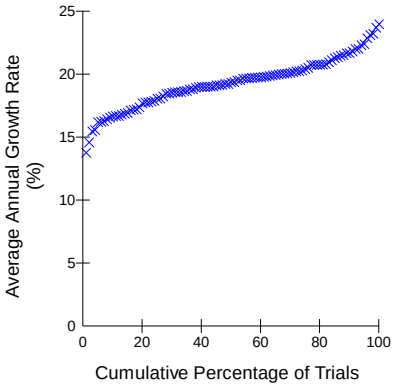


Population Sizes in 11 Years*

	Minimum	Average	Maximum
Lowest Trial	414	889	1744
10th Percentile	427	1084	2148
25th Percentile	436	1186	2417
Median Trial	452	1289	2718
75th Percentile	484	1407	3018
90th Percentile	503	1533	3370
Highest Trial	647	1906	4523
Lowest Trial	851	1899	3773

* 0 to 20+ year-old horses

In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 414 and the highest was 4523. In half the trials, the minimum population size in 11 years was less than 452 and the maximum was less than 2718. The average population size across 11 years ranged from 889 to 1906.



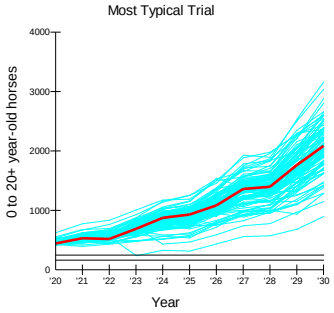
Average Growth Rate in 10 Years

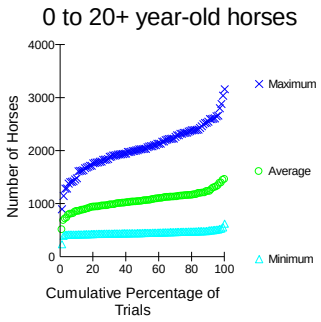
Lowest Trial	13.8
10th Percentile	16.7
25th Percentile	18.1
Median Trial	19.4
75th Percentile	20.5
90th Percentile	21.8
Highest Trial	24.0

* 0 to 20+ year-old horses

Alternative Considered but Not Analyzed: Population Growth Suppression Only.

Population Size



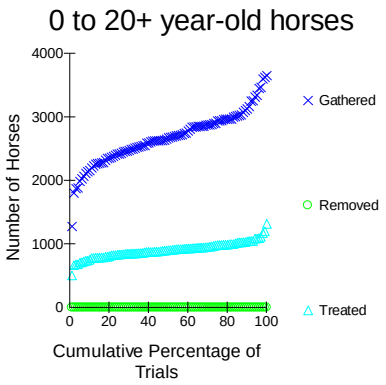


Population Sizes in 11 Years*

	Minimum	Average	Maximum
Lowest Trial	239	512	900
10th Percentile	423	858	1550
25th Percentile	436	959	1816
Median Trial	452	1055	2038
75th Percentile	474	1152	2341
90th Percentile	497	1236	2576
Highest Trial	626	1461	3164

* 0 to 20+ year-old horses

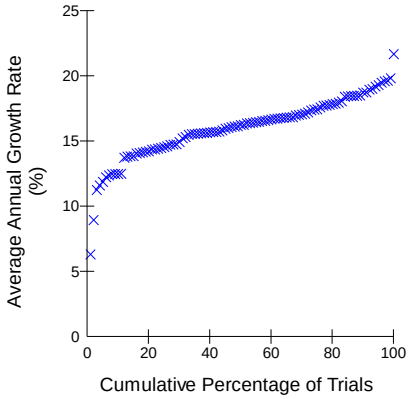
In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 239 and the highest was 3164. In half the trials, the minimum population size in 11 years was less than 452 and the maximum was less than 2038. The average population size across 11 years ranged from 512 to 1461.



Totals in 11 Years*

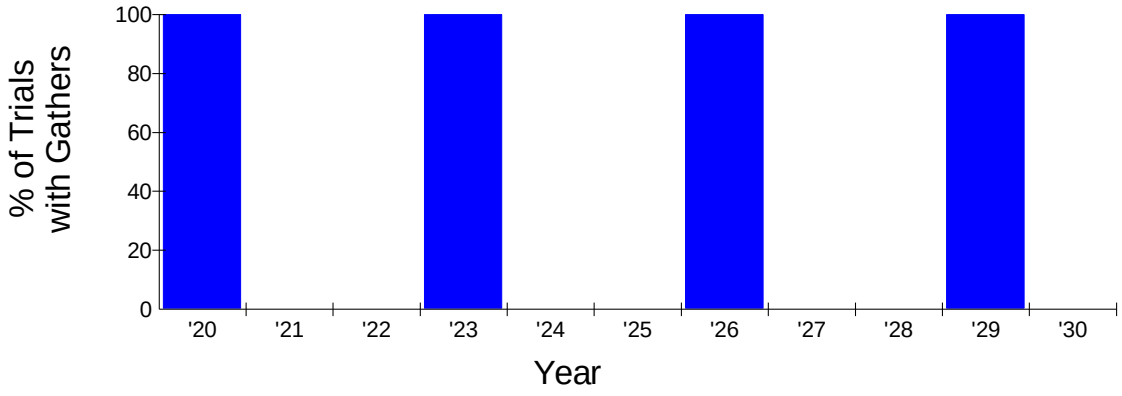
	Gathered	Removed	Treated
Lowest Trial	1279	0	506
10th Percentile	2180	0	768
25th Percentile	2428	0	836
Median Trial	2678	0	904
75th Percentile	2944	0	986
90th Percentile	3150	0	1046
Highest Trial	3655	0	1320

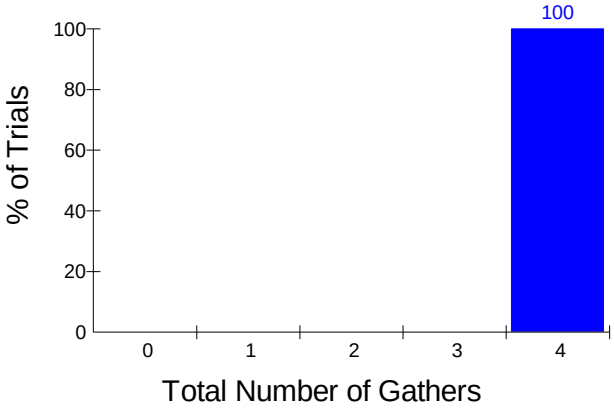
*0 to 20+ year-old horses



Average Growth Rate in 10 Years

Lowest Trial	6.3
10th Percentile	12.5
25th Percentile	14.6
Median Trial	16.3
75th Percentile	17.5
90th Percentile	18.8
Highest Trial	21.7




100
100
80
60
40
20
0
% of Trials
0
1
2
3
4
Total Number of Gathers

Appendix 6. Population Inventory

M E M O R A N D U M

To: Chad Hunter, Trent Staheli (BLM)
CC: Gus Warr, Paul Griffin, Alan Shepherd, Holle Waddell (BLM)
From: Bruce Lubow, Ph.D.
Date: 15 September 2020
RE: Statistical analysis for 2020 surveys of wild horse abundance in Chloride Canyon HMA, Sulphur HMA, Blawn Wash HA, Frisco HMA, and Conger HMA.

Summary Table

Start date	End date	Area names	Area IDs
8 June 2020	8 June 2020	Chloride Canyon HMA	UT0442
8 June 2020	10 June 2020	Sulphur HMA	UT0448
10 June 2020	11 June 2020	Blawn Wash HA	UT0441
11 June 2020	14 June 2020	Frisco HMA	UT0445
14 June 2020	14 June 2020	Conger HMA	UT0553
Type of Survey: Simultaneous double-observer			
Aviation Details	Helicopter: El Aero Aviation, Pilot Cody Johnson, Bell 206 L4 #N226GM		
Agency Personnel	Observers: C. Hunter, T. Staheli, M. Bayles, J. Bulloch, E. Shotwell (BLM) Helicopter managers: R. Reed, I. Garthwait (BLM)		

Summary Narrative

In June 2020 Bureau of Land Management (BLM) personnel conducted simultaneous double-observer aerial surveys from a helicopter of the wild horse abundance in 4 Horse Management Areas (HMA) and 1 Herd Area (HA; Summary Table). Surveys were conducted using methods recommended by BLM policy (BLM 2010) and a recent National Academy of Sciences review (NRC 2013) with detailed field methods described in Griffin et al. (2020). I analyzed these data using established statistical methods to estimate sighting probabilities for horses, then used these sighting probabilities to correct the raw counts for systematic biases (undercounts) that are known to occur in aerial surveys (Lubow and Ransom 2016), and to provide confidence intervals and other measures of uncertainty associated with the abundance estimates. The estimated numbers of wild horses present in each of the surveyed areas at the time of the surveys are reported in Table 1.

Estimated abundance (Estimate) are for the numbers of horses in the surveyed area at the time of survey. 90% confidence intervals are shown in terms of the lower limit (LCL) and upper limit

(UCL). The coefficient of variation (CV) is a measure of precision; it is the standard error as a percentage of the estimated abundance. Number of horses seen (No. Seen) leads to the estimated percentage of horses that were present in the surveyed area, but that were not recorded by any observer (% Missed). The estimated number of horses associated with each HMA but located outside the HMA's boundaries (Est. No. horses Outside HMA) is already included in the total estimate for that HMA.

Table 1. Estimated Horse Numbers

Area	Age Class	Horses	LCL[1]	UCL	Standard Error	CV %	Horses Seen	Horses Missed %	Number of Groups	Group Size	Foals per 100 Adults	Horses Outside HMA
Chloride Canyon HMA	Total	74	66	85	6.0	8.1	71	4.3	15	4.8	20.0	0
	Foals	12	10	16	1.3	10.1						
	Adults	62	54	71	5.1	8.2						
Sulphur HMA	Total	938	914	974	19.4	2.1	901	4.0	187	5.0	21.5	156
	Foals	166	159	174	4.1	2.5						
	Adults	772	752	802	16.5	2.1						
Blawn Wash HA	Total	129	120	143	7.1	5.5	124	3.5	27	4.7	12.5	39
	Foals	14	13	16	0.7	5.0						
	Adults	114	120	128	6.7	5.8						
Frisco HMA	Total	238	218	260	12.6	5.3	223	6.5	46	5.1	17.7	163
	Foals	36	32	41	2.7	7.4						
	Adults	203	186	222	10.8	5.3						
Conger HMA	Total	179	151	203	14.6	8.2	160	10.4	31	5.8	23.2	0
	Foals	34	28	37	2.7	8.1						
	Adults	145	121	168	13.0	8.9						

[1] 90% confidence interval based on percentiles of bootstrap simulation results. The lower 90% confidence interval limit (LCL) is actually less than the number of horses sighted during the survey for many of these estimates. This is a normal statistical result and reflects the fact that a confidence interval expresses what would likely happen if the survey were repeated. If repeated many times, some surveys would miss more horses and produce lower estimates, even after corrections, than were actually observed during this survey. Clearly, I conclude that there are at least as many horses as were observed during this survey, rather than using the lower confidence limit as a minimum number.

[2] The estimated ratio of foals to adults reflects what was observed during this June survey and may not represent the full cohort of foals for this year.

Results

The June 2020 surveys recorded sightings of 282 horse groups. Fortunately, these surveys were conducted using similar methods and the same pilot, 2 front seat observers, and 3 back seat observers, so it was possible to pool data from these 5 surveys to obtain an acceptable sample size of 260 groups sightings that were suitable for modeling sighting probability (Table 2). Estimated sighting probabilities were high, resulting in the statistically estimated percentage of

horses present in the surveyed areas that were not observed ranging from 3.5% - 10.4% across the 5 management areas. This level of sighting probability resulted in precise estimated confidence intervals and coefficients of variation ranging from 2.1% - 8.2% for individual management areas (Table 1). In addition to the measured error rates, unmeasured biases in the estimates could still exist due to heterogeneity of sighting probabilities that were not fully accounted for in this dataset, but these are likely inconsequential given what appeared to be high sighting probabilities, nearly ideal sighting conditions, and skilled observers.

Sighting Probability Analyses

The front observers saw 87.3% of the groups (90.4% of the horses) seen by any observer, whereas the back-seat observers saw 71.9% of all groups (77.6% of horses) seen in these surveys. At least one observer (front or back) missed 32.1% of horse groups seen by the other (Table 2.B). These results demonstrate that simple raw counts do not fully reflect the true abundance without statistical corrections for missed groups, made possible by the double observer method and reported here. There were undoubtedly additional groups not seen by any observer; I address this issue in the analysis that follows. The analysis method used for the surveyed areas were based on simultaneous double-observer data collected during these surveys.

Informed by preliminary analyses and *a priori* reasoning, I included 3 parameters to explain sighting probability differences among horse groups in all models; these were: (1) group size; (2) effect of groups on pilot's side for front seat sighting probability; and (3) average backseat observer position effect. All 3 of these parameters were very strongly supported in preliminary analyses and have been found to be important in nearly all similar surveys.

In addition to the 3 common parameters, I also tested 6 possible effects on sighting probability by fitting models for all possible combinations with and without these effects, resulting in 64 alternative models. The 6 effects examined were: (1) horse group activity; (2) presence of trees; (3) percent vegetation cover; (4) distance between observers and horse groups; (5) alternate front seat observer, TS; and (6) either a common intercept for all 5 management areas or separate values for each.

Sighting probability for the 11 groups in the pooled dataset seen on the centerline was set to 0.0 for back seat observers reflecting their inability to see animals passing directly beneath the aircraft. Sighting probability for the 12 groups seen spread across the centerline and visible to both back-seat observers was estimated based on their independent availability to both observers, thereby increasing total estimated detection probability for these groups relative to groups available to only one side.

I did not consider effects on detection probability of broken vegetation cover type, rugged terrain, or snow cover due to absence of variation of the values of these covariates. I also did not include separate covariates for the effects of individual back-seat observers after preliminary analyses indicated minimal support for separate effects beyond a single average effect for the back-seat position.

Of the parameters tested, the strongest support was for the effect of percent vegetation cover (77.2% of AIC_c model weight). There was also moderate support for effects of: front-seat observer TS (61.9%), presence of trees (49.3%), and horse group movement (41.2%). There was

weak support (25.8%) for a distance effect. Support was almost evenly split between a single average intercept (49.8%) versus 5 unique intercepts for the 5 management areas (50.2%). As expected, visibility was higher for horse groups that were larger or moving, and lower for groups on the pilot's side of the flight path, in trees, and in greater vegetation cover (Table 3).

The estimated sighting probabilities for the combined observers ranged across horse groups from 56.2%-100%. For front-seat observers, independent sighting probability ranged from 36.6-99.5% and for back-seat observers from 36.0-98.4% for groups available to them. All but 21 groups (7.4%) had estimated sighting probability of ≥80%. Comparing actual horses seen to the estimated abundance computed from the estimated sighting probabilities, I estimate that 5.1% of the horses in the 2020 survey were never seen by any of the observers across the 5 management areas. The high sighting probabilities leads to high precision and tight confidence intervals (Table 1). The high sighting probabilities estimated for this survey are largely due to the absence of obstructing terrain, appropriately spaced transects, and skilled observers.

Assumptions and Caveats

Results from this double observer analysis are a conservative estimate of abundance. True abundance values are likely to be higher, not lower, than abundance estimates in Table 1 because of several potential sources of bias listed below. Results should always be interpreted with a clear understanding of the assumptions and implications.

1. The results obtained from these surveys are estimates of the horses present in the surveyed area at the time of the survey and should not be used to make inferences beyond this context. Abundance values reported here may vary from the annual March 1 abundance estimates for the HMA; aerial survey data are just one component of all the available information that BLM uses to make March 1 abundance estimates. Aerial surveys only provide information about the area surveyed at the time of the survey, and do not account for births, deaths, movements, or any management removals that may have taken place afterwards.

2. Double-observer analyses cannot account for undocumented animal movement between, within, or outside of the surveyed area. Fences and topographic barriers can provide deterrents to animal movement, but even these barriers may not present continuous, unbroken, or impenetrable barriers. It is possible that the surveys did not extend as far beyond a boundary as horses might move. Consequently, there is the possibility that temporary emigration from the surveyed area may have contributed to some animals that are normally resident having not being present at the time of survey. In principle, if the level of such movement were high, then the number of animals found within the survey area at another time could differ substantially. If there were any horses that are part of a local herd but were outside the surveyed areas, then Table 1 underestimates true abundance.

3. The validity of the analysis rests on the assumption that all groups of animals are flown over once during a survey period, and thus have exactly one chance to be counted by the front and back seat observers, or that groups flown over more than once are identified and considered only once in the analysis. Animal movements during a survey can potentially bias results if those movements result in unintentional over- or under-counting of horses. Groups counted more than once would constitute 'double counting,' which would lead to estimates that are biased higher

than the true number of groups present. Groups that were never available to be seen (for example due to temporary emigration out of the study area or undetected movement from an unsurveyed area to an already-surveyed area) can lead to estimates that are negatively biased compared to the true abundance.

Survey SOPs (Griffin et al. 2020) call for observers to identify and record 'marker' animals (with unusual coloration) on paper, and variation in group sizes helps reduce the risk of double counting during aerial surveys. Observers are also to take photographs of many observed groups and use those photos after landing to identify any groups that might have been inadvertently recorded twice. Unfortunately, there is no effective way to correct for the converse problem of horses fleeing and thus never having the opportunity for being detected. Because observers can account for horse movements leading to double counting but cannot account for movement causing horses to never be observed, animal movements can contribute to the estimated abundance (Table 1) potentially being lower than true abundance.

4. The double observer method assumes that all horse groups with identical sighting covariate values have equal sighting probability. If there is additional variability in sighting probability not accounted for in the sighting models, such heterogeneity could lead to a negative bias (underestimate) of abundance. In other words, under most conditions the double-observer method underestimates abundance.

5. The analysis assumes that the number of animals in each group is counted accurately. Standard Operating Procedures (Griffin et al. 2020) specify that all groups with more than 20 animals are photographed and photos scrutinized after the flight to correct counts. Smaller groups, particularly ones with poor sighting conditions such as heavy tree cover, could also be undercounted. Any such undercounting would lead to negatively biased estimates of abundance.

Evaluation of survey and recommendations

It appears that survey protocols were followed well and with enough consistency among the 5 surveys to enable useful pooling of data for more precise estimates of sighting probability. Observers were all experienced and well trained, and visibility conditions were very good. Nevertheless, 2 observations about the recorded data deserve mention. First, 33 observations were recorded as being in trees but with <25% vegetation cover, which is not a valid combination according to the survey protocols. Second, no observations were marked as being in rugged topography. Although this could be correct, maps (Figure 1) show horse groups observed in what appears to be at least somewhat rugged topography, although the maps don't confirm that these locations met the criteria specified in the survey protocols for that designation. These aspects of the protocol should be carefully reviewed by all observers before future surveys.

As is often the case, there is reason for concern regarding geographic closure. There are numerous observations of horse groups outside of or near the boundaries of the management areas in locations where no obvious natural or artificial deterrents to horse movement ensure that additional horses were not farther outside of the area surveyed at the time of the surveys (Figure 1). Flightlines were extended well beyond the HMA boundaries in some areas and not in others, such as some areas around Blawn Wash HA, where horses were seen even at the most distant locations surveyed beyond the HA boundaries. Other areas where I am unable to confirm barriers

to horse movement from available GIS data are reportedly bounded by fencing or natural obstacles (Chad Hunter, BLM, Personal Communication, 9/3/2020). Consequently, it is difficult for me to be sure there were no more horses outside of the HMAs in areas not surveyed. I suggest consideration of modified transects for future surveys that extend the survey area boundaries even further, to ensure covering all areas potentially occupied by horses associated with these management areas, or to confirm that the current survey boundaries do cover the full extent of horse range in this area.

An important concern arises from reports based on ongoing research on horses at Conger HMA that indicate a significantly higher abundance of horses than is estimated in Table 1 (Sarah King, personal communication, 24 August 2020). The discrepancy cannot be explained by double-observer data alone. It is possible that horses on the Conger HMA survey either 'froze' under cover at the sound of an approaching helicopter or were more easily frightened by the approaching helicopter and fled from it to seek cover. Either outcome could reduce detection probabilities of such groups. Multiple recent gathers conducted in this HMA using helicopters could have inadvertently sensitized horses to a perceived threat from helicopters (Trent Staheli, personal communication, 25 August 2020). The rugged terrain in parts of the Conger HMA could afford opportunities for horses to hide, potentially leading to groups with zero or low probability of being detected by aerial observers. In either case, the estimate from the aerial survey (Table 1) is likely to be negatively biased.

District personnel also suspect that the abundance estimates at other HMAs (e.g., Chloride Canyon, Sulphur, and Blawn Wash) were lower than expectations (Chad Hunter, BLM, Personal Communication, 9/3/2020). As far as I know, no quantitative data covering entire HMAs exist to further examine this possibility for these management areas. However, the ongoing research at Frisco HMA suggests that the estimates presented here are likely accurate for that HMA (Sarah King, personal communication, 24 August 2020), so the validity of the methodology is supported by that result.

If it were true that some of these estimates are too low, it would almost certainly be due to a violation of one of the 5 assumptions listed in the previous section. The most likely candidate is assumption #4, regarding unexplained heterogeneity among horse groups. In particular, the fact that no horse groups were observed in the large areas of rugged terrain raises the possibility that visibility in those areas is very low (although the possibility that horses do not use those areas can’t be ruled out).

For horses that might move exceptionally in response to helicopters, such as may be the case at Conger HMA, it has been found that under similar circumstances at other HMAs, that surveying from a fixed-wing airplane is less likely to startle horses and cause them to flee. Unfortunately, the terrain at Conger HMA probably requires a helicopter. Another way to improve detectability of horses on future surveys could be to space transects closer together in rugged terrain. However, I advise that the alternative with the best chance for success in areas like this with thick vegetative cover and varied topography is to switch the survey method from double-observer to photographic mark-resight (Lubow and Ransom 2009). This alternative method is effective in moderate-size populations (<100 groups) where coloration and other individual markings enable observers to uniquely identify each group of horses from photographs taken on

multiple occasions and has been demonstrated to produce accurate abundance estimates where detection is difficult and other methods fail. The alternative photographic mark-resight method could be used in all the management areas reported here, except for Sulphur, which is probably too large.

If none of the above modifications produce results that local managers consider accurate, the best alternative may be to retest the methodology on populations of known size, such as Conger HMA or Frisco HMA. The goal would be to see if accurate results can be obtained when unusual problems do not arise and some modifications are made to the survey design, as suggested above. If such tests fail, then a onetime study with some horses marked with radio collars could determine the necessary correction for otherwise unmeasured heterogeneity bias (see Griffin et al. 2013).

Table 2. Tally of actual observations (A) used for abundance estimation and (B) used for model fitting of horses and horse groups by observer (front, back, both, and either) for combined survey areas. These tables are based on raw counts (not statistical estimates) and, therefore do not address groups not seen by any observer.

A. Observations used in abundance estimate.

Observer	Groups Seen (Raw Count)	Horses Seen (Raw Count)	Actual Sighting Rate[1] (groups)	Actual Sighting Rate[1] (Horses)
Front	249	1,351	88.3%	91.3%
Back	203	1,149	72.0%	77.7%
Both	170	1,021	60.3%	69.0%
Combined	282	1,479		

B. Observations Used in Model Fitting.

Observer	Groups Seen (Raw Count)	Horses Seen (Raw Count)	Actual Sighting Rate[1] (groups)	Actual Sighting Rate[1] (Horses)
Front	227	1,200	87.3%	90.4%
Back	187	1,030	71.9%	77.6%
Both	154	902	59.2%	67.9%
Combined	260	1,328		

[1] Percentage of all groups seen that were seen by each observer.

Table 3. Illustration of the effects of observers and sighting condition covariates on estimated sighting probability of horse groups for both front and rear observers. Baseline case (**bold**) is for observers in the indicated seat that are not on the pilot's side, for the average back-seat observer and front seat observer CH, sighting horse groups of 5 horses (the median group size), that are not moving, not in trees, in 0% vegetation cover, at a distance of 0-0.25 miles, and for the average across the 5 management areas. Other cases vary a covariate, one effect at a time, as indicated. Sighting probabilities for each row should be compared to the baseline (first row) to see the effect of the change in observer or condition. Baseline values are shown in bold wherever

they occur. Sighting probabilities are calculated from weighted averaged model parameters across all 64 models.

Sighting Condition Effect	Sighting Probability		
	Front Observer[1]	Back Observer[2]	Combined Observers
Baseline	92.1%	76.3%	98.1%
Group size (*N*=1)	86.6%	64.3%	95.2%
Active group	92.5%	77.4%	98.3%
Tree	90.9%	73.4%	97.6%
Vegetation cover 50%	87.6%	66.6%	95.9%
Vegetation cover 90%	81.6%	57.5%	92.2%
Distance (0.5-1.0 miles)	92.1%	76.3%	98.1%
Chloride Canyon HMA	92.3%	76.8%	98.2%
Sulphur HMA	92.2%	76.6%	98.2%
Blawn Wash HA	92.4%	77.1%	98.3%
Frisco HMA	91.9%	75.9%	98.0%
Conger HMA	91.2%	74.7%	97.8%
Pilot's Side	80.7%	73.6%	94.9%
Front Observer TS	75.7%	73.6%	93.6%

[1] Sighting probability for the front observers acting as a team, regardless of which of the front observers saw the horses first.

[2] Sighting probabilities for back observers for horse groups that are potentially visible on the same side of the aircraft as the observer. Sighting probability in the back is 0 for groups on the opposite side or centerline.

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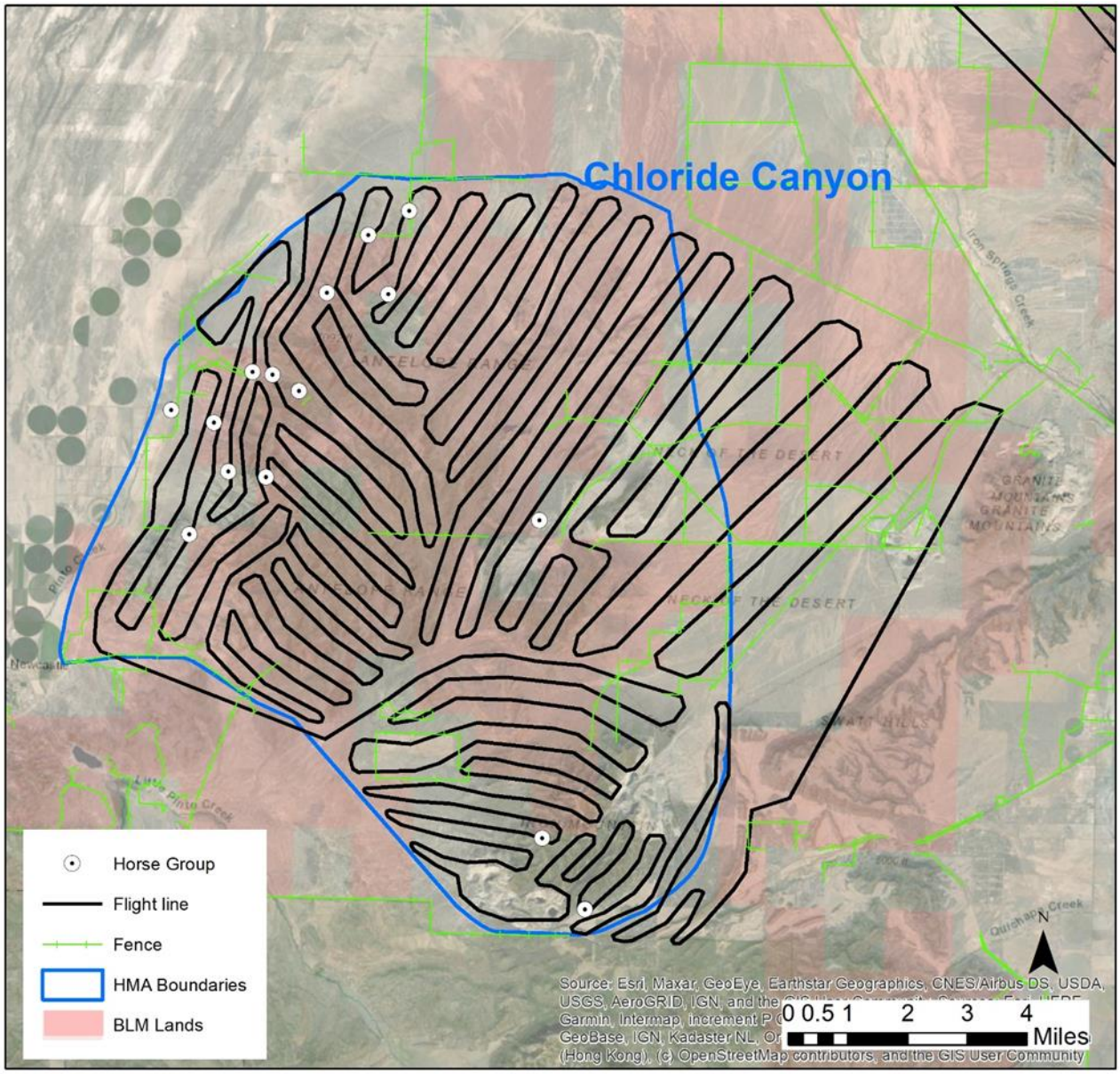
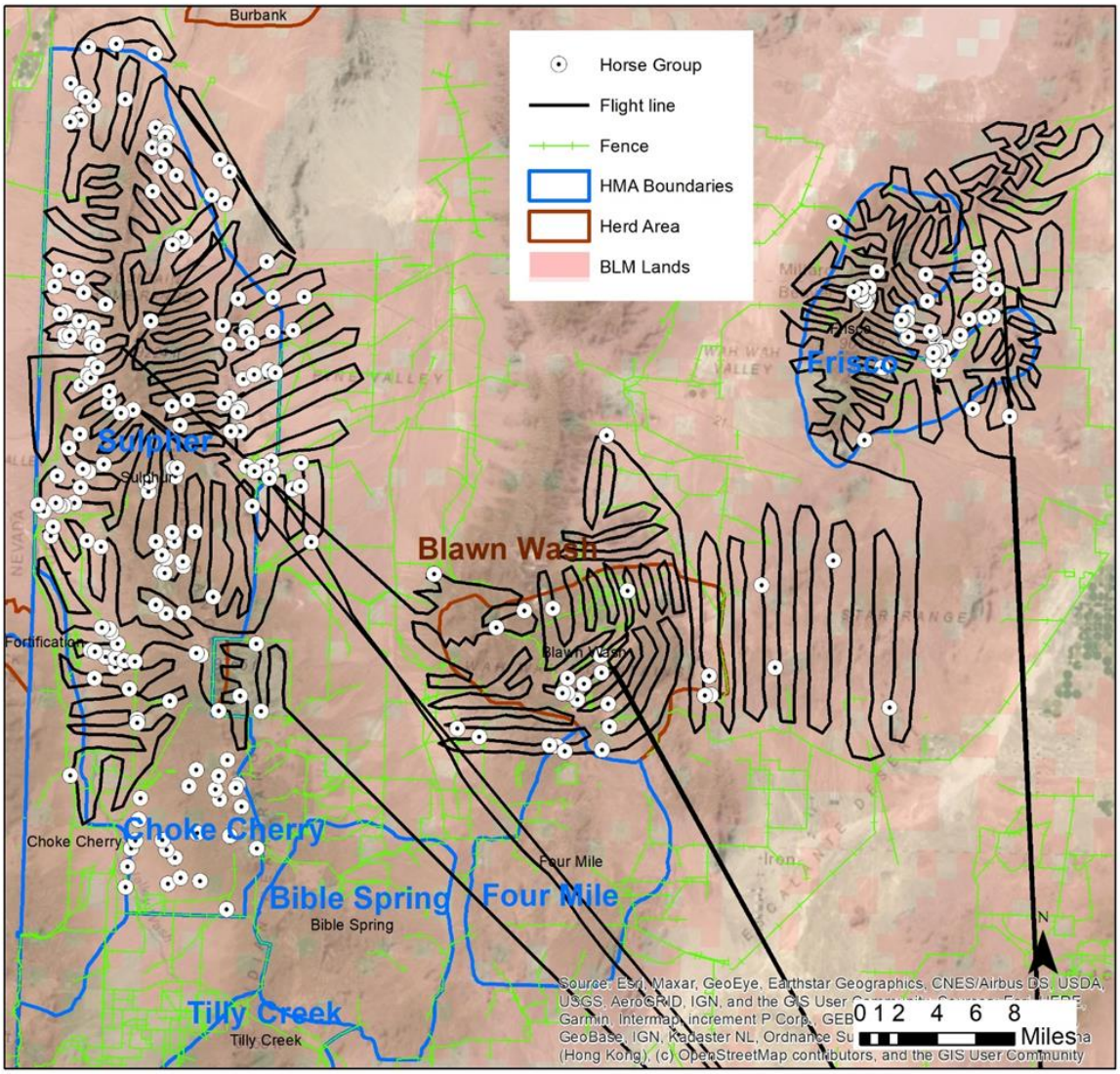
Figure 1. Maps (3 pages) of survey area showing actual recorded flight track (Sulphur HMA, Frisco HMA, and Blawn Wash HA) and planned flightlines (Chloride Canyon HMA and Conger HMA; recording was unavailable) for helicopter surveys, along with HMA/HA boundaries, known fence lines, and approximate locations of observers when horses were sighted.

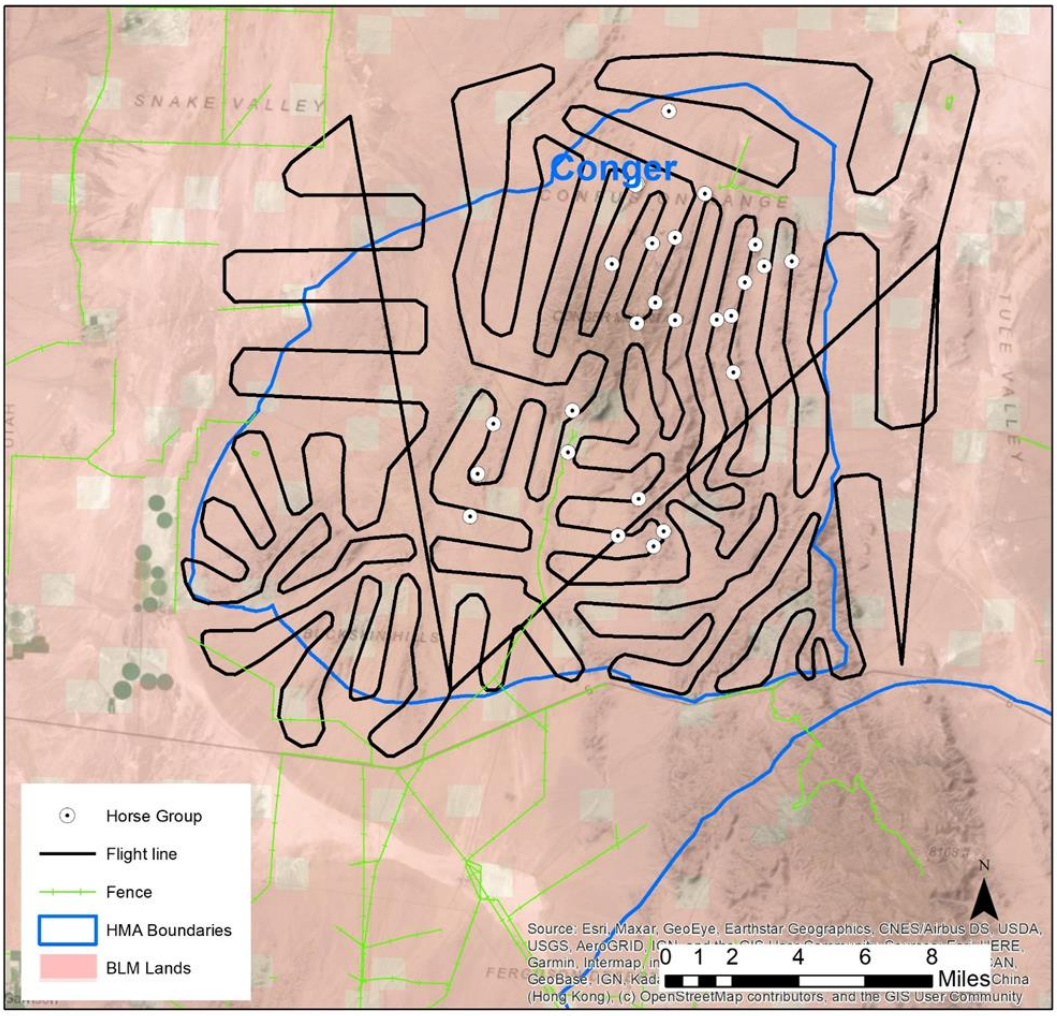
Chloride HMA



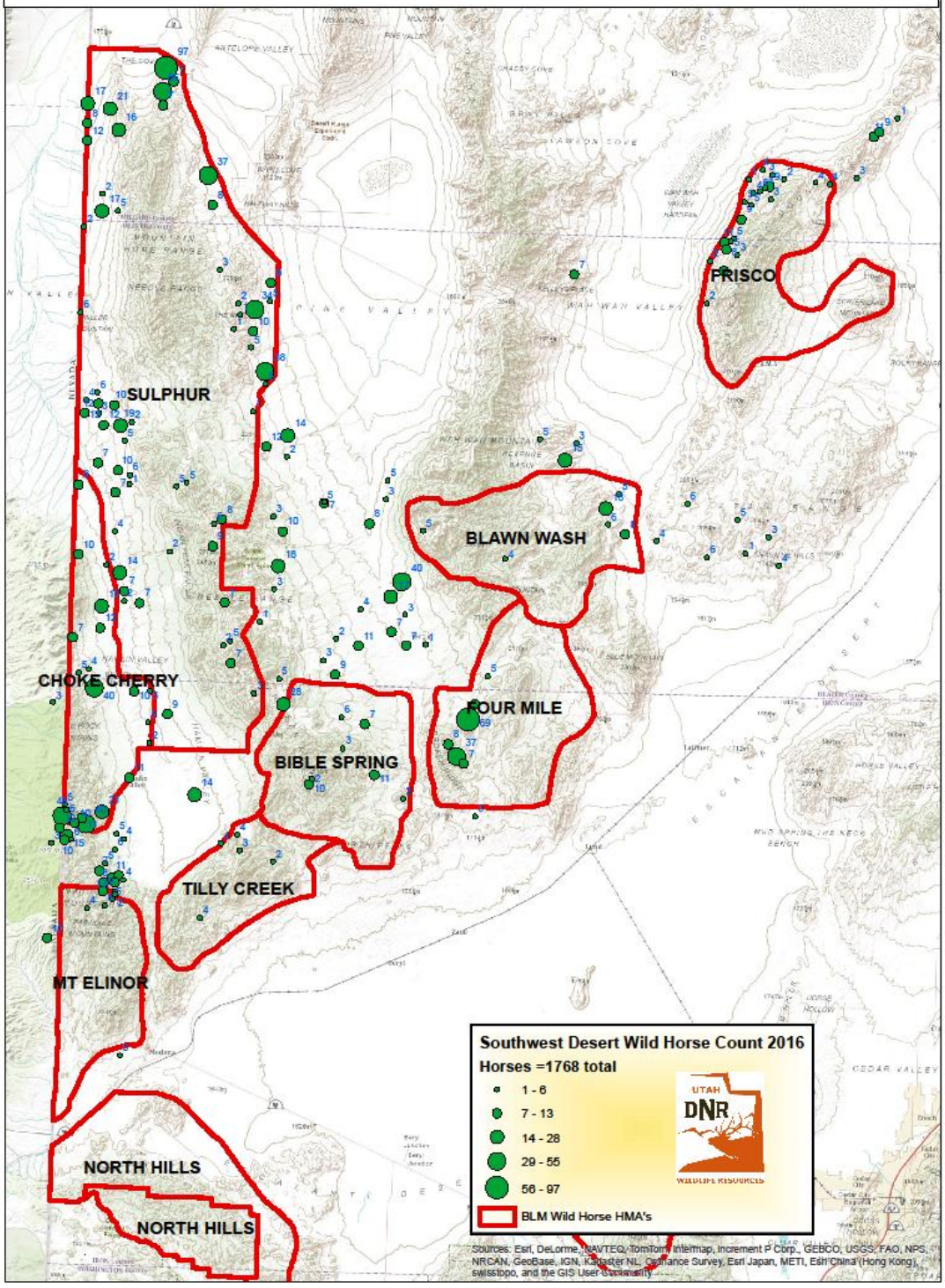
Sulphur HMA, Frisco HMA, and Blawn Wash HA



Conger HMA


SNAKE VALLEY
Conger
TULE VALLEY
Horse Group
Flight line
Fence
HMA Boundaries
BLM Lands
N
0 1 2 4 6 8
Miles
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Garmin, Intermap, in
GeoBase, IGN, Kadas
(Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Wild Horses on the Southwest Desert Unit (Counted during Elk Census flight by UDWR)



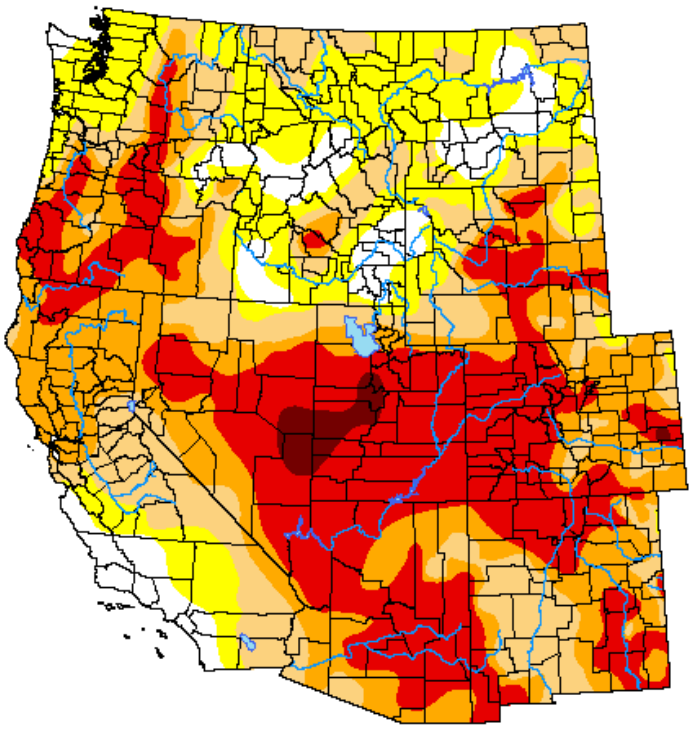
U.S. Drought Monitor

West

September 22, 2020

(Released Thursday, Sep. 24, 2020)

Valid 8 a.m. EDT



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:

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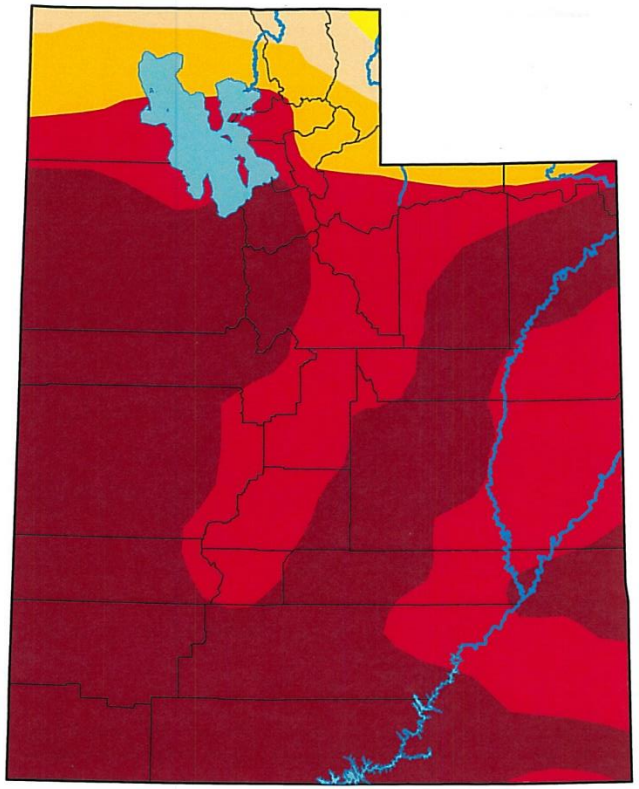
U.S. Department of Agriculture

droughtmonitor.unl.edu

U.S. Drought Monitor

Utah



March 16, 2021

(Released Thursday, Mar. 18, 2021)

Valid 8 a.m. EDT

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

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